

Literature Review

University Budgeting Models and Impacts on Organisational Performance

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Section 1 - Introduction

This review proposes to summarise the literature to date describing the various budgeting methods available to universities and to compare and contrast the advantages and disadvantages of each specifically related to organisational performance. A review of this type has not been completed previously in an Australian or international setting and represents an exciting management tool to improve organisational performance using specific budgeting models. Various Australian University models will be reviewed in conjunction with performance measures for those institutions. The review aims to uniquely blend research in finance, accounting, strategy and higher education to determine if there is a causal relationship between the budgeting model used and the performance of the institution on standard publically available teaching, research, engagement and financial metrics. Literature will be reviewed from Australia, North America and Europe. Additionally, the paper will describe elements of the Australian system in detail, for readers unfamiliar with specific aspects, to enable a comprehensive understanding of the external environment and the relationship to university budgeting models.

The thesis will first begin by describing the university sector in Australia, specifically highlighting the changes that have occurred in the past few years and the rapid pace of competition and innovation. Thereafter a university planning cycle and budget will be explained in broad terms describing its elements and discussing significant design factors, together with the likely consequence of those factors on performance. This will be followed by a detailed review of budgeting models as described in the literatures in conjunction with a detailed analysis of five actual budgeting models used at the University of Sydney (USyd), Macquarie University (MQ), University of Melbourne (UMelb), Griffith University (GU) and University of South Australia (UniSA). Lastly, we propose to explore the relationship between the budgeting model used and the major aspects of university performance, within the sample group, to describe and quantify this relationship.

Overview of the Australia Higher education Sector

The University sector is characterised by a strong value system (organisational mission) to deliver teaching and research in a complex environment with intense global competition (King, Marginson et al. 2013) and shifting government policies (Mohrman, Ma et al. 2008). The regulatory and compliance environment is also diverse and complex and this creates additional administrative requirements that permeate all elements of the university from curriculum related areas, to student services, administrative areas such as marketing, finance, human resources and to work health and safety (Christopher 2012, Massy 2013, Parker 2013, Auditor-General 2015, DeptOfEducation 2015).

Government policy changes introduced by John Dawkins (Education Minister 1987-92) in his Green Paper 1987, The introduction of Tertiary Education Quality and Standards Agency (Dawkins 1987) have increased pressure on universities to deliver improved outcomes for teaching and research, while

rapidly improving efficiency and productivity (Massy 1996, Slaughter 2004, Lomax-Smith 2011). The structure of the Australian higher education sector is based primarily on government funding on a per student basis and on a competitive basis for research through the Australian Research Council (ARC). Funding per student is provided based on the overall number of students and different amounts of funding are provided dependent on the field of study with more expensive areas funded to a greater extent (<https://www.education.gov.au/commonwealth-grant-scheme-cgs>). Areas such as medical related programs, science and engineering receive more funding from the government as these programs are often more expensive to teach given the laboratory nature of the teaching, which is generally not required for business and humanities courses. The overall viability of the universities portfolio of programs is expected to be managed by the university with some programs supporting the financial aspects of operations and others supporting the intrinsic values of the university. Universities are afforded the ability of autonomous governance and management and under this structure a university is also free to operate independently including the creation or deletion of programs to suit the organisational needs. Universities are also expected to generate some surplus funds to maintain existing and build new facilities.

Currently, the fees for undergraduate domestic programs are regulated by the government Higher Education Support Act (2003). There are two components of the funding; the first being the government contribution amount and the second being the amount the university can charge the student (in addition to the government contribution, called the student component). Universities have the opportunity to lower the student component of the fee, although to date Australian Universities generally charge the prescribed maximum fee as set out in the government schedules in the Higher Education Funding Act (Government 2003). The fee per student is identical between domestic students studying the same program but at different universities, and is independent of the reputation of the organisation and any measure of student outcomes or quality measures associated with teaching or research quality. The government does not pay a fee subsidy for international students. Fees for international undergraduate students and postgraduate international and domestic students can be set by the institution and these amounts are unregulated by the government. Competition in the sector serves as a regulatory mechanism to ensure fees are representative of the underlying demand for places at an institution and of the institutions ability to deliver teaching services. Large universities with higher world rankings and in major cities usually set fees above other universities as places at these institutions are in greater demand.

As fees are set at a constant rate (for undergraduate domestic students), other factors such as organisational reputation, entry score requirements and location play a more significant role for a student to determine which university they will study at (Mohrman, Ma et al. 2008, Forbes-Mewett and Nyland 2012, Carlitz 2013). Universities control this flow by increasing or decreasing the entry

score required (ATAR's; Australian Tertiary Admission Rank) for acceptance into a program and this score differs between institutions. Fees are at set rates; consequently universities cannot increase revenue without increasing the number of students, restricting the institutions ability to increase revenue while keep the student numbers unchanged.

The mission of Universities generally includes elements of teaching, research, stakeholder engagement, and in some cases patient/animal care (where the university operates a hospital or veterinary hospital) (Forbes-Mewett and Nyland 2012, Massy 2012, Bhayat, Manuguerra et al. 2015). The revenue streams derived by universities include both restricted and unrestricted (Richard J. Meisinger and W.Dubeck 1984, Massy 1996) use portions and expenses are incurred to support the underlying missions of the organisation together with the delivery of prescribed research, funded through those restricted sources. Unsponsored research is also funded from operating allocations (unrestricted funds) and this relates to the research work an academic engages with that is not directly related to a grant or formal research contract (Massy 1996). Unrestricted funds are those earned by the university through teaching and unrelated to the delivery of a specific research project. Funds are derived to support these pursuits from government allocations and from profit motivated activities.

Each university has a different strategic focus between teaching, research and outreach and this may change from time to time in line with the overall strategic direction of the institution. The funding balance too changes from time to time between government sourced amounts and those derived through profit motivated operations of the university or from restricted use grant funding. Institutions with sizable donation (Moll and Hoque 2011, Parker 2013) and benevolent funds can often shield operations from market volatilities such as changes in student numbers or changes in government policy, through the use of the earnings from these sources or from the capital (Slaughter 2004, Hermes, Smid et al. 2007, Bennouna, Meredith et al. 2010, Chittenden and Derregia 2013). Often these donations are for restricted purposes such as to fund positions in particular disciplines or to fund the cost of certain assets (e.g. the construction of a new building). In some cases though, large institutions that have significant pools of restricted use funds, often face similar issues of funding shortfalls compared to smaller organisations due to their inability to use those funds how and where they are most needed.

Policy changes too have in turn caused funding volatility to Universities (Lomax-Smith 2011), p7 'The current university funding context'. In response universities have tried to diversify their income sources (Mohrman, Ma et al. 2008, Auditor-General 2014, Auditor-General 2015) by also engaging in profit motivated or commercial ventures, together with the normal business of teaching and research. In describing this phenomena (Raines and Leathers 2004) note that 'modern universities are complex multi-purpose institutions that engage in a number of activities that have little or nothing to do with traditional academic work of teaching and research'. Over time the imperative to reduce funding

volatility begins to dominate compared to the mission of universities due the relative ease of judgement between profit-driven projects and those that are mission-based (Bhayat, Manuguerra et al. 2015). To fund income generating initiatives universities have four potential sources that include debt (borrowings), fund raising, accessing retained surpluses or cash reserves, or by reducing existing internal budgeted allocations, to specific faculties or offices, to fund the new venture. These methods may be used in conjunction with each other and use of one method does not preclude the other methods being employed; however, additional administrative obligations would arise through the use of debt funding consistent with standard debt related contracts. Choosing to fund such ventures by reallocating existing sources generally has the largest impact to the organisation as it means other areas must contract or become more efficient to operate with reduced resources, and if these areas relate to teaching and research, there is a long term risk to the university achieving its overall strategic goals (Neumann and Lindsay 1988, Carlitz 2013, Fung 2013).

Competition in the sector has also intensified with new and emerging global entrants and emerging technologies. The rise of Massive Open Online Courses (MOOCs) (Cooper 2013, Massy 2013) and competition from the local sector from training providers and TAFEs together with international competition from Canadian, US and UK universities have, over the past decade, become a lot more aggressive - aiming for student growth. China has been building new universities every year and teaching in English to attract students (Johnstone 2004, Parker 2013). These activities have caused a gradual reduction in the number of international students in Australia. The impacts of reduced international student numbers to the Australia sector is significant in that international students pay significantly higher fees, for the same program, as compared to domestic students. Declines in international student numbers consequently have a more than proportional impact of the revenue of universities, placing significant additional burdens on existing students and staff.

The rise of MOOCs through organisations such as Udacity, EDX, Coursera and iTunesU have significantly increased competition, and with this new paradigm also comes a different business model and associated cost structures. Costs within these organisations focus on areas directly related to teaching and as the physical infrastructure is limited these organisations avoid the large investments traditional universities make to keep land and maintain buildings. There is also no evidence that these institutions fund unsponsored research, which is usually paid for by traditional universities. In Australia, various universities allow academics to spend 40% of their time conducting unsponsored research, thus a saving of that component for organisations running MOOCs is significant. The result is often a course that is provided at a fraction of the cost of a traditional course (or at no cost at all).

MOOCs have grown in response to student demands for low cost and easy access to education, provided on demand, and using online means (Cooper 2013). Students enrolled in traditional universities are also now demanding online teaching methods causing pressure on these institutions

to innovate and modify their business models to meet the demands of students. In cases where the existing infrastructure for the delivery of online education is not present, universities are faced with a significant investment to create such platforms or to partner with existing providers.

The rate of change within the sector is significant, as described above, with the challenges of also balancing intrinsic value and market demands, changing policy and the need for universities to diversify their income streams, many institutions are examining their budgeting approaches to determine their efficiency and effectiveness in aiding the organisation to prosper. Budgeting processes are being examined as they represent the intersection of various strategic and policy imperatives of an organisation and the method, of budgeting, further provides behavioural guidance (Ezzamel, Robson et al. 2012, Van Puyvelde, Caers et al. 2012), either implicit or explicit, towards desired outcomes (Parker 2013). In times of significant constraints and change it is also imperative that the process itself, of translating organisational objectives into financial requirements (budgeting) be efficient, effective, transparent and afford the proper accountability at the proper level to ensure prosperity.

Budgeting Models

Traditionally university management has operated in a highly controlled manner where the budgeting and decisions were made at the central authority level (Massy 2013). Budgeting was usually completed on a line item and incremental basis where each particular category was examined and usually increased by the inflation rate or by some other factor. The complexities of understanding programs of study (i.e., at the Degree level) together with the complexity of understanding their contribution to profitability means that line item budgeting is the simplest alternative to achieve some level of resource control. With this approach and over time, departments and faculties develop a sense of entitlement to the budget base, given that movements from year to year are largely based on increasing each line item, and those departments would subsequently plan to spend all the money provided. The budget base represents the previous year's budget and if this is increased year-on-year by say, the rate of wages growth or the rate of inflation, over time the increases become more pronounced and independent of the main revenue and cost drivers of the university. This conceptually does not cause any issues when the organisation is in periods of growth, similar to or greater than the growth in wages or inflation, as revenue will also keep pace. However in times where growth is lower than the underlying wages growth, it is at this point that the model begins to show weakness in its application to help the organisation achieve its goals, as departments still expect an increasing budget. This expectation may be fair where in previous years this was done, and budget model users take precedent in this fact when setting future budgets, and precedent in the fact that the increase may be independent of the main drivers within the organisation. Programs and operations would continually expand, being supported by the central budget allocation, however these programs often lack a connection with market demand. Consequently programs and operations could grow independently

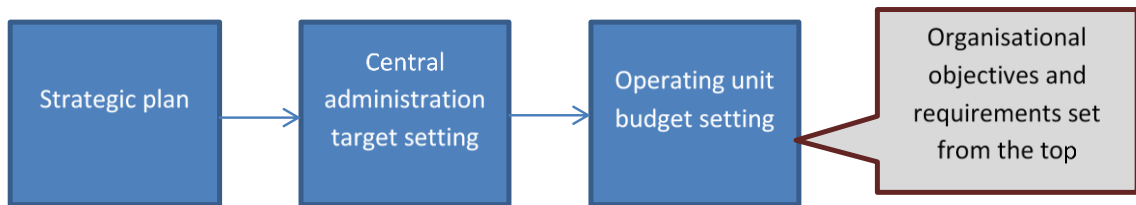
of demand, by being supported by the central allocation. Behaviourally the year-on-year allocation in this manner would also reinforce the message to staff that they were doing the right thing given that money was always provided and increased (Hansen, Otley et al. 2003, Hansen and Stede 2004, Parker 2013).

Under this approach the central authorities also strive to reduce and limit funding volatility, driven by changes in demand, by absorbing the upward and downward movements and by re-allocating internal resources such as donations and investment income towards supporting unpopular programs. The incremental approach to budgeting is thus often described as being fair and efficient (Goldstein 2012). Fairness is achieved as all units receive the same incremental upwards or downwards change in funding while the system is efficient in that all areas have a fixed starting point for changes, being the previous year's budget.

In addition to these complexities, evidence does show that the process followed through a budget impacts outcomes (Massy 1996). For example, a budget that is compiled completely at a central level then passed down to faculties or department may create disengagement compared to a budget that is built from the department and faculty upwards (López 2006). Yet the latter model may cater so far towards the department and faculty requirement leaving out the overall organisational objectives. Over time the use of certain budgeting processes and practices also then impacts the organisational culture as staff read into the implied signals provided through the process.

A top down process results in operating units being led to a pre-defined outcome with little consideration of feedback (Savenije 1992) from operating areas although with a greater emphasis on the achievement of organisational goals. Although Parker (2013) finds that the top-down approach provides a mechanism for the vice chancellor and senior management to be completely responsible for all decision making, similar to a corporate environment, and facilitating more precise strategic change. Kenny (2009) noted that in studying Australian Universities, the most common management structure was a top-down mechanism, although with some universities taking a more flexible approach with selected operating units enabling a more bottom up management structure. The literature also suggests though that for long term sustainability, within a University context, that a top-down approach is not the most effective mechanism for achieving strategic goals (Kenny 2009, Christopher 2012, Gonçalves Veiga 2015) . A bottom-up approach allows operating units to lead the process and to set objectives that are focused on specific needs, and less so than on organisational needs (Libby and Lindsay 2010, Carlitz 2013). Both models achieve varying degrees of engagement and require the appropriate governance and support structures to help ensure engagement within all levels of the organisation. However, the top down approach naturally requires more structures to help ensure stakeholder acceptance at lower levels within the organisation. The diagram below (Figure 1 - Top down and bottom up planning) describes a typical top down and bottom up approach.

Top down approach



Bottom up approach

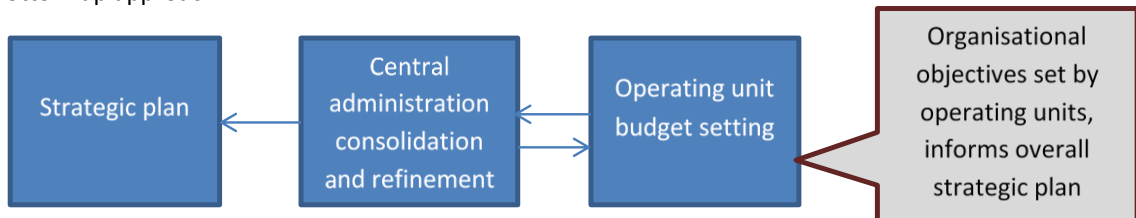


Figure 1 - Top down and bottom up planning

The budgeting process should firstly consider contextual and strategic factors, the characteristics of the budget model itself and the desired outcomes (Ferreri and Cowen 1993, Hansen, Otley et al. 2003, Hansen and Stede 2004). The importance of linking strategic planning to budgeting is also one way in which organisations can help ensure long term organisational success (Brinkman and Morgan 1997, Kong 2005, Libby and Lindsay 2010). In addition, the link between planning and budgeting should be formal to ensure the practical implementation of the strategic plan, as opposed to it being a plan that lies unused on a shelf (Johnson 1998). The budget also clearly reveals the primary goals of the organisation and of the leadership team, and serves as a practical and visible component, of the operating impacts of the strategic plan (Barr 2003). Varlotta finds that in 'well organised universities, the overlap between where the university places its financial resources, and what the strategic plan has highlighted as its priorities, is precise' (Varlotta 2010).

In cases where the bottom up approach is used many of the contextual and external data elements are collected and assessed at the operating unit level. Varlotta adds to this premise with a number of additional elements that are important from an internal organisation perspective and highlights the need for the process to be built in alignment with the mission, values and vision of the organisation (Varlotta 2010).

Strategic planning is described most clearly as the alignment of internal programs and structures to the internal and external environment (Komives 2003), and this is seen as the first process step in any budgeting methodology. Strategic planning usually includes a pre-planning step that examines the broad internal drivers and challengers, an environmental scan to assess competition, laws and other external factors, a prioritisation phase by which a choice is made between competing alternatives and finally an evaluation phase. Typically the internal analysis is compiled by central finance (McCreedy 1986) and includes a projection of costs over the medium term including salaries, capital works and

strategic initiatives, combined with detailed projections of teaching and research income. In many instances there will be a deficit which will require management action to address, and these types of questions are precisely the objective of the strategic planning process. Stakeholders part of the process then need to assess how best to achieve the objectives in an efficient and effective manner, and the outcomes of these discussions are used to frame individual Faculty and operating unit budgets. An operating unit includes non-teaching or research related administration areas such as a centralised human resources (HR) function or a centralised finance function. In cases where a strategic plan is not present, budgets often lack consistency between organisational units (Ferrerri and Cowen 1993) and consistency over time, illustrating the importance of the strategic planning process at the beginning of the budget (Libby and Lindsay 2010).

In addition to the budget being framed firstly with the organisational strategic plan (Hansen and Stede 2004), it is imperative that a level of consistency is maintained to other major planning processes that occur on a cyclical basis (Figure 2 - Planning cycle). A detailed and consistent organisational and operating unit budget structure helps stakeholders conceptualise the tight links that are present within an organisation and highlights where resources are allocated to achieve organisational outcomes. The diagram below shows a typical structure of a planning cycle within a University and each bubble represents a specific planning task. In some organisations tasks may be joined to form a single process, for instance Revenue Setting may be combined with Budget Targets.

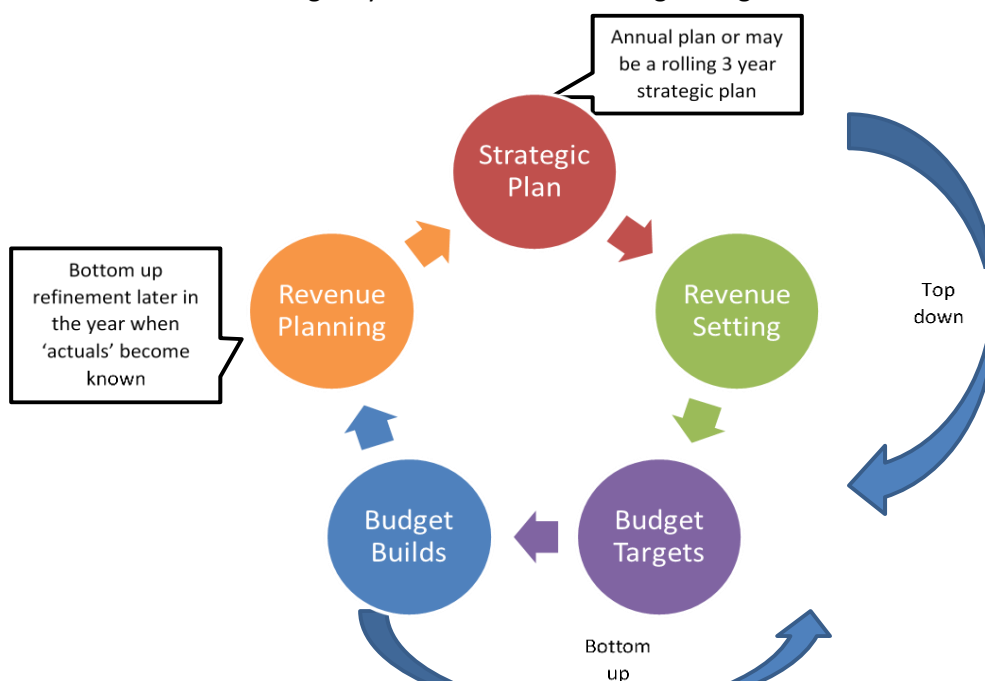


Figure 2 - Planning cycle

Revenue setting entails the university looking at fees and estimating enrolments down to a lower level by major groupings, although still largely in a top-down manner (Libby and Lindsay 2010). The task is framed by the outcomes of the strategic plan although now consists of lower level operational measures detailing the options available for the University to achieve the strategic goals. The major

groupings of revenue represent the sources of income such as undergraduate fees, post graduate course work fees and higher degree research fees (for PhD's and research masters courses) or may consist of overall growth requirements for each faculty or operating unit. Further other significant items can be split out such as domestic undergraduate fees and international undergraduate fees. The separation of key elements assist the organisation to focus on specific strategies to address specific needs, however it is important to ensure there are not a large number of separate elements (at this step in the planning process) as this level of complexity would detract from the overall objectives of the planning step – which is high level planning. Later steps cater for the option to include additional variables/scenarios into the planning process.

The Budget Target (Figure 2 - Planning cycle) process refers to a task to formulate the outcomes of the Strategic Plan to the more near term budget, with the objectives split by operating units. The Strategic Plan usually covers a period of between 3 and 10 years (depending on the industry) and articulating these targets to a term more closely aligned with the operational planning cycle represents a crucial translational step to ensure consistency between the budget, the strategic plan and operational plans (Johnson 1998). At this step it is important from a procedural perspective to gain stakeholder acceptance and to engage a broad range of budgetary participants (Ezzamel, Robson et al. 2012). A broad engagement also assists in achieving a more equitable result and by enhancing the concept that the process is open, transparent and requires meaningful engagement, results in a budget that represents a meaningful representation of operational realities (Oakes, Townley et al. 1998). At this step individual areas may express a preference towards certain objectives (e.g., to grow PhD numbers), while others may express objectives to pursue other goals. The step also requires individual areas to prioritise their goals and to match them to the overall university objectives (Sellers-rubio 2010). In some cases organisational objectives may be required to change in quantum (e.g., higher or lower growth) or to change altogether to achieve the overall goals. A clear issue that occurs when central authorities change the self-defined goals of a unit is a lack of engagement and other structures need to be put in place to help achieve university goals.

The Budget Build process (Figure 2 - Planning cycle) typically includes the detailed steps taken by an operating unit to construct their budget. The type of budget model used will impact the manner in which income is estimated together with expenses, and under some approaches such as line item budgeting, only estimates of expenses are required, ignoring income completely. The process and contextual factors impact on budgeting compilation and budgeting behaviour. These contextual factors include the following (Ferrerri and Cowen 1993):

- leadership style,
- diversification of programs,
- management centre size,

- organisational culture, and;
- perceived financial health.

Other factors that impact on the budgeting method employed and the process include (McCready 1986):

- level of centralisation or decentralised decision making
- openness of the process
- demand and availability of information, and
- the method in which management performance is measured.

Hansen and Stede (2004) offer a unique perspective noting that historically budgeting is researched with respect to a single aspect, being performance. However they suggest that many reasons exist for the completion of a budget, including performance (Kong 2005) evaluation and also as a method to aid organisational planning, a method for communicating goals and a method of assisting with strategy formation.

The level of openness and transparency employed through the process also impacts the level of commitment stakeholders have towards fulfilling the agreement constituted by the organisational budget. Where a committee exist to sort, prioritise and assess budget initiatives, with respect to the strategic plan, this indicates a more open process (Ferreri and Cowen 1993), and where the decision is made by a single individual or a small group, this indicates a closed process. The process and rules governing the construction of the budget may also purposefully seek to exclude or limit certain groups influence and or enhance the level of influence other areas maintain; such equalising processes may be beneficial to the organisation. This is especially the case with modern universities that maintain diverse portfolios. Hills describes modern universities as a 'loosely organised group of sub-organisations characterised by a need to pursue self-interest' (Hills 1978).

The steps to build a budget should follow logically and clearly based on the previous steps. The building of budgets for each operating unit represents the most detailed piece of work in the overall planning cycle. It should engage the stakeholders involved in the previous steps together with other operational staff and represents the point of intersection between two competing forces, the first being political theory (Chaffee 1983) and the second scientific/business theories. The two theories, demonstrated in practice, cause tension in balancing the mission elements within an organisation together with objectives of financial sustainability (Toms 2010, Bhayat, Manuguerra et al. 2015). It is also the point at which 'administration comes into its own' (Rossmann and Shanahan 2012) where the competing forces are balanced to achieve a defined set of financial objectives (the budget) that will assist the organisation fulfil its strategic goals. An open process will engage all levels of staff, while a closed process will create distrust and will facilitate a weakening of organisational accountability principles

(Schick 1985). In addition, where stakeholders view the process as largely serving a particular need within the organisation or an external need, without a clear attempt to balance competing needs, this further creates a disjointed budget and one that is constantly challenged through the budget cycle (Moll and Hoque 2011). More broadly, the budget is as much of a leadership and management tool as it is a computational exercise (Finney 1994) and should be constructed with this in mind.

Revenue planning is the last step to complete one iteration of the planning cycle and provides the baseline information to move back into strategic planning as the next phase in the cycle (and begin the cycle once again). The step describes the overall process that occurs to ensure the organisational budget targets are attained irrespective of unplanned movements in revenue and/or costs. It is a process to refine the budget (and operational plan) based on more current information. This is often the case with many Australian Universities where budgets are completed in September or October assuming certain student intakes in the following year, although students only receive their ATAR's (matriculation results) in late December or January, and only then make firm decisions on which university they would like to attend and studying which particular program. This can often occur through a given year as part of the normal variance management of a budget or, as is the case with Australian Universities, can occur at the point at which undergraduate applications are counted and assessed with respect to meeting the course entry requirements. This is done through a clearing house (called the Universities Admissions Centre in NSW, and similar organisations serve the other states and territories), and it occurs after students receive their matriculation results. The budget for the year is likely to have been set and approved months earlier, so this point of assessment allows the first iteration of amendments to the budget, which is in effect an assessment of the budgeted student numbers expected compared to the actual numbers that have accepted offers of entry. At this point the University is also able to assess whether the mix of students by major groups (undergraduate, post graduate coursework, and post graduate research) is in the same pattern as was expected, when building the budget. The mix is important given the differences in fees and costs of each major group (UG, PG coursework, and HDR) and the contribution to the overall university surplus or deficit – in much the same manner as different lines of product contribute to profitability in a retail outlet (Rosenbloom 2013). A total student intake comprising a different mix compared to that initially budgeted can have significant impact from an operational and financial perspective and thus amending the planning to reflect this information, at the revenue planning phase, can limit any adverse consequences.

The revenue planning phase occurs at multiple points through the year, corresponding to the major entry points for students and or the notification of grant successes, and should serve to inform the next phase in the planning cycle. The next phase being the beginning of another iteration of the planning cycle and starting again with organisational strategic planning. Regular and consistent

revenue planning assists to act as a method of forecasting future intakes by allowing the results of various scenarios to be assessed (Gambelli, Vairo et al. 2010) to make better and more informed estimates of the future.

The completed cycle should then be examined with respect to the following:

- How well the process and budget supported the strategic plan, articulated the link between mission and money (Hansen and Stede 2004, Bhayat, Manuguerra et al. 2015)
- The clarity of the budget in highlighting the trade-offs and prioritisations made towards the organisational goals (Sellers-rubio 2010)
- How well the process assisted in the clarification of work agreements between staff and management (Varlotta 2010).

Accounting and Budgeting Models

There are two major elements that make up the budget and they include the operating budget and the capital budget (Oakes, Townley et al. 1998, Slaughter 2004, Bennouna, Meredith et al. 2010, Chittenden and Derregia 2013). In many institutions these are kept separate and consolidated at the organisational level. Naturally the two budgets impact each other in specific instances such as when a new building is commissioned. The costs, after initial construction, thereafter move from the capital budget to the operating budget and the more capital that is produced and the greater its age the larger the contribution of operating funding required, to maintain that capital and through depreciation costs. In many instances the capital budget is also supplemented with additional operating budget taxes, which is another point of intersection with the two budgets and this usually occurs to move funds from operating, to a pooled source, to allow the organisation to incur large expenditures to fund major projects. The approaches within these two budgets can also differ, and as they impact each other, it is imperative that they operate in unison.

Within the structure of a budget there are two main classification systems used (Ferreri and Cowen 1993, Massy 1996). The classification systems are either based on functional classifications or based on what is commonly referred to as natural codes. Functional classification systems group revenue and cost elements based on their purpose (not their type), and headings may include teaching, research, administration and any number of special project accounts. Taking a natural code perspective the income and expense categories are described by their type (not their purpose), and may include salaries (for tenured or full-time staff), salaries for non-permanent or casual staff, maintenance, travel, stationery, utilities, consumables and minor equipment purchases. The use of either classification system has different advantages and disadvantages. For example taking a functional perspective makes it simpler to understand the costs associated with research (where research is a functional heading), although more difficult to understand the sub-components of research such as salaries,

equipment and travel. Taking a natural code perspective provides an informative perspective of the type of costs such as travel and salaries, although does not provide details of what is actually occurring in the organisation. This method relies on succinct narrative explanations linked to costs increases and decreases to allow transparency. In many organisations a natural code focus is used for standard operating budgets, while a functional approach is taken for distinct projects.

The classification method provides differing perspectives of transparency of a budget, especially when historical data is available for comparative purposes (López 2006). Over time, the classification method impacts behaviour, which ever approach is used. However determining which budgeting classification system with which budgeting approach to use, allowing the most efficient, effective and equitable outcomes presents a significant challenge for most universities.

Sector Overview

At present there are 44 institutions in Australia that are Higher Education Providers (<http://docs.education.gov.au/node/34675>, downloaded 18/06/2014), offering a broad range of courses. One university is private (Bond University) and the remaining 43 are funded by the government and other sources. At the time of starting this paper in 2014 only audited public data was available for 2012. Just prior to submission of this work new data was available for 2013 and checks showed no significant differences in trends compared to the 2012 data. In 2012, 58% of funding was from the government and the remaining amounts from full fee-paying domestic and international students, research activities, contracts and consultancies, property and investment income, and donations and bequests (<http://education.gov.au/finance-publication>, '2012 Finance Publications and Tables'). (Figure 3- University sector income summary)

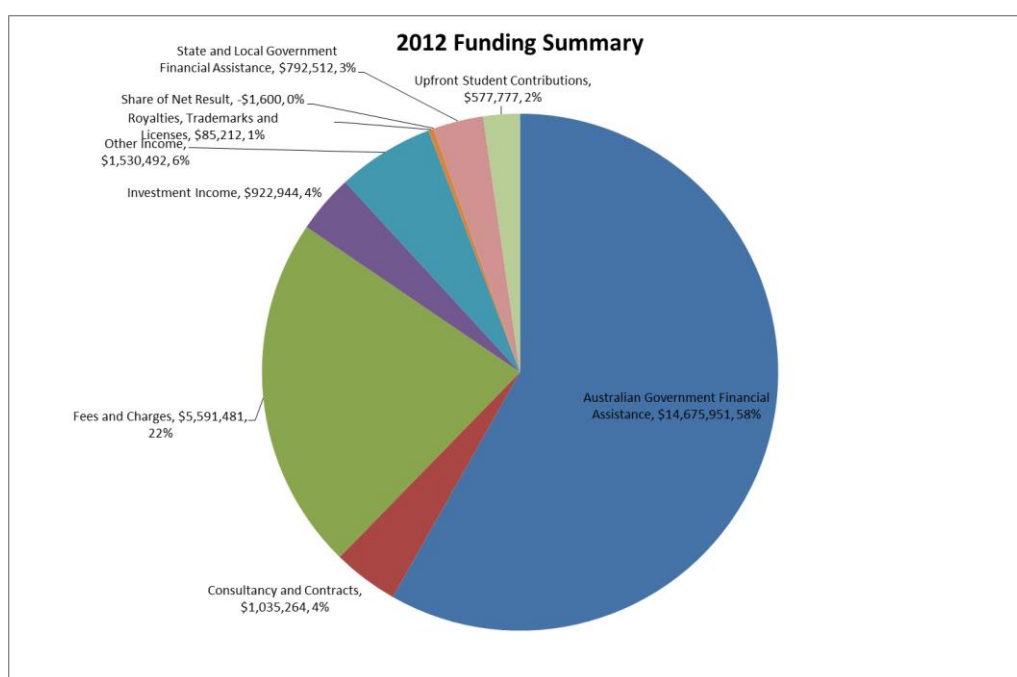


Figure 3- University sector income summary

The government provides funding based on the number of full-time equivalent Commonwealth supported students enrolled in units of study (Lomax-Smith 2011). Units of study are classified into clusters and with government funding and student contributions differing dependent on the classification. Funding levels are uncapped (with the exception of some courses such as Medicine) and provided on the basis of student enrolments. Previous government policy capped (restricted) the funding provided to each institution, although the policy from 2013 to present provides uncapped funding for domestic undergraduate students. Additional loadings are provided to some institutions based on their location or course offerings and are provided in addition to Base Funding - Regional, Enabling, Transitional and Medical Student Loading payments (Higher Education Support Act 2003, Commonwealth Grant Scheme Guidelines No. 1) (Government 2003).

Government funding in 2012, per university, ranged from \$18m to \$974m. Of the 44 institutions, the largest 10 universities received approximately 50% of government funding, while the smallest 10 universities received about 6% of total government funding.

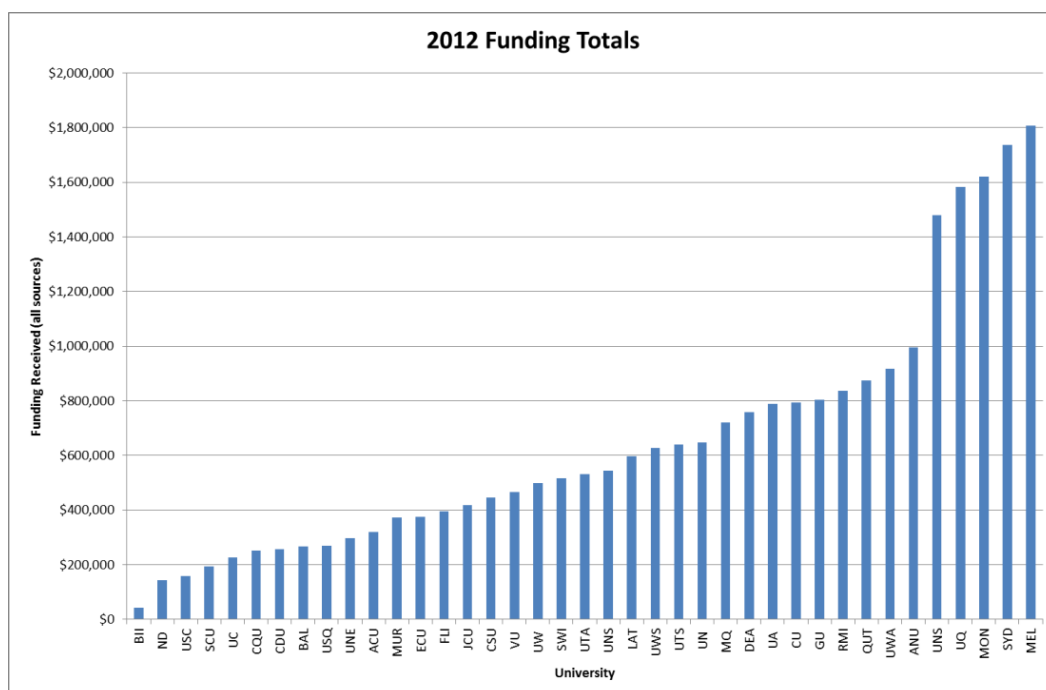


Figure 4 - Funding by university (see appendix for explanation of abbreviations)

Each university maintains either a direct or indirect budgeting model, with specific alterations to suit the organisational needs and particular internal and external factors (Massy 2013). This approach is identical to that followed by commercial organisations in that the budgeting approach chosen will depend on the needs of the organisation considering the best manner in which to achieve those, given the internal and external environmental factors (Parker 2013). These internal and external factors are constantly changing and to ensure the budget model meets the organisational needs, it also requires constant refinement and in many cases it requires a complete change in approach (Libby and Lindsay 2010, Varlotta 2010). The internal elements of the organisation include the organisational culture, the

level of centralised or decentralised decision making, the overall strategic objective of management and the size of the organisation. In addition, budgeting models change over time, to meet the needs of the organisation, so a model that is fair, efficient and effective under a particular organisational and environmental context may not be operationally sound when the circumstances change. Generally a model is changed when the level of inefficiencies or externalities of the current approach exceed general levels of tolerance or when there is a significant internal or external change (Ezzamel, Robson et al. 2012). A major internal change could be a change in strategy from a centralised university management structure to a decentralised structure, with the budgeting approach changed accordingly. While an external factor could be significantly lower funding from the government that requires drastic internal changes to accommodate the consequences, while ensuring the organisation remains financially viable.

From a process perspective, in changing times, the method of altering the budgeting model approach is often as important as determining which approach is the best. A poor implementation of a new approach, much in the same context of implementing a new project in general, will fail if the proper method is not employed (Kotter 2007).

Lastly, budgeting represents a complex political process that requires participants to express intrinsic values and quantitative ones, to negotiate an agreed outcome (Chaffee 1983). Negotiations are often based on definitional elements with each party describing the intrinsic value in different ways and its impact on the more quantitative aspects of the universities operations. The complexity of the negotiations is increased by the fact that at any one time the negotiation is likely to span a number of periods (McCready 1986) as strategies often take a number of years to implement. The reason for this is that a decision in one period is likely to have consequences also in the following periods and as such negotiations entail bargaining between requests now and those required in the future, balanced with the need to react to unplanned events and to assess actual performance compared to expected results. The final outcome of these negotiations is an agreement between the parties about their mutual obligations for the upcoming year, both financially and operationally, and a joint appreciation of the challenges and sacrifices that have been made to achieve the objectives.

Section 2 – A comparative assessment of budgeting models in the literature

Every institution has its own unique set of organisational characteristics that define it at a particular point in time. These characteristics include age, size, geographical location, organisational culture, structure, governance and accountability model, competitive position, and strategic objectives. In a constantly changing internal and external environment, the organisation too changes as does the organisational needs and objectives. The budget model a University chooses needs to reflect the organisation and serves as a tool to help achieve the objectives, be it teaching excellence, research excellence, growth, contraction or a variation of these elements. The budget model also needs to be

capable of reflecting different objectives within different parts of the organisation and in totality being a tool that assists and enables the organisation to implement strategy (Varlotta 2010). If the model is not capable of meeting these objectives, then it needs to be assessed and redesigned.

The budgeting process and outcomes are one of the most significant elements for an organisation from year to year. It brings together the various aspects of an organisation from the strategic plan to lower level operational plans, into a form that attaches resource requirements to those elements. In addition, the budget helps determine the allocation of resources between organisational units to achieve joint or individual objectives, between the various parts including faculties and or central offices. The process itself has an important role in that a good process will engage the right people, together with the right information, and create a joint vision that clearly articulates expectations and includes elements of rewards, consequences for underachievement and inspires organisational innovation.

The roles of a budget (McCready 1986) can be summarised as the following:

- An instructional plan of action
- An institutional contract
- A control mechanism
- A gauge of risk
- An instrument of communication
- A political device; and Meisenger adds
- A mechanism for setting priorities (Richard J. Meisinger and W.Dubeck 1984)

These roles must be fulfilled for the various components of the organisational budget which usually comprises the operating budget, capital works budgets, other budgets for restricted use such as project accounts or gifts and bequests, faculty or school budgets, service centre budgets for central areas such as finance, human resources or marketing and for other associated enterprises linked to the university such as external businesses, hospitals and or clinics (McCready 1986, Massy 1996). Also insert refs from Resource Allocation in Higher Education.

Budgeting models can be categorised into two broad groups, direct models and indirect models (Table 1 - Direct Budgeting Models, Table 2 - Indirect Budgeting Models). Direct models are those where revenue and costs flow directly through to the profit centres based on the operating unit that earned the revenue and that incurred the costs. Costs also includes taxes and other subventions (Massy 1996) to fund central functions and or to fund strategic initiatives. Indirect models are those where revenue and or costs do not flow directly or completely to the area that generated the funds and incurred the costs. Income allocations, using an indirect approach, are usually based on the application of a formula or process, where the unit is then required to allocate costs – and these income allocations may differ

considerably from the income the organisation receives from the government or from student fees. The main point being that income allocation formulas are designed to serve organisational strategy and instances can arise where strategies are incentivised irrespective of external funding being received and this can occur where an organisation sees merit in pursuing a different path rather than a path directly linking external funding to internal operations. Indirect models can also take the form of being models that simply deal with costs, where costs are allocated to achieve certain objectives, with little or no regard to the income that will be derived by these activities. In these types of models, income is often simply allocated to balance the costs to reflect a budget with a zero bottom line.

With indirect models the relationship between income and costs may range from no relationship to some relationship, although excludes a complete relationship (Moll and Hoque 2011). Direct models have a complete relationship between income and costs. Indirect models allow central management more power and control over resource allocations, while power and control within direct models more closely lies away from central university management.

Table 1 and Table 2 describes the two broad methods of budgeting, the characteristics of the model and the objective.

Direct models have the benefit of being simple to understand although they are generally also the more complex to operate (Massy 1996, Parker 2013). Complexity arises more so with costs rather than with revenue, as revenue generally flows straight through to the relevant operating unit. Costs may be categorised into two elements being direct and indirect costs. Direct costs flow through to operating units completely, while indirect costs are often allocated to the operating unit based on an apportionment of total costs and usage. These two categorises are analogous to a profit and loss (P&L) measured at the gross margin level or at the net margin level, respectively. In a corporatised sense the net margin level includes indirect costs such as selling, general and administration (SG&A) charges, in assessing profitability. Direct costs generally include charges for tangible items (as opposed to service elements that are intangible). Indirect costs include elements such as charges for space, charges for central services such as the provision of IT or the provision of HR services. Complexity arises with these elements as the total costs are apportioned to each operating unit based on a usage (driver) measure. As an example, charges for central IT services may be based on the number of staff in the operating unit, or the number of students, or a combination of factors. As more drivers are used for each of the various cost elements, more complexity arises for users to understand the increases and decreases in costs. This difficulty is further increased by the fact that these indirect costs often represent a large proportion of the total costs of the operating unit and may increase in a manner that is unrelated to the operating units' key operational drivers. An example of this may be where the central IT area invests in significant new technology – these additional costs would be apportioned, based on the

relevant driver, and each operating unit would absorb part of the costs. These costs may also be seen as uncontrollable, given that they occur in other operating units.

Table 1 - Direct Budgeting Models

Model Group	Characteristics	Revenue and Costs	Budget Objective
<u>Direct</u> (Responsibility centre budgeting, profit centre budgeting and zero based budgeting)	Straight through revenue and costs. Most areas considered profit centres including internal service areas such as Finance, HR, etc. Few areas cost driven and may include, the Executive Management team and staff. Accountability may lie at a 'gross surplus/profit' level or at a 'net surplus/profit' level	Revenue – straight through to profit centres Internal services areas charge a fee for their services, based on volumes. Costs – straight through. Also including centrally applied taxes for the costs of certain areas such as the Executive Management team and staff, and to fund strategic initiatives	Balanced budget, surplus or approved deficit to operating units

Indirect models (Table 2, below) vary with respect to complexity with the simplest variation being one that allocates resources based on costs. Budget participants, using this type of model, review previous historical expenditure and simply add or subtract amounts from the previous year's amounts, focusing on areas of significant upward or downward variation. The underlying budget base is maintained and variations occur upwards (and more rarely, downwards) compared to that base. The base itself may not be reviewed from year to year and is often assumed as a starting point for discussions and assumed as agreed. Over time a difficulty arises in understanding what the budget base actually represents, after adjusting for the many upward and downward movements through time. The primary issue is that the base rarely, if ever, is reduced as generally operational activities are constantly increased without any consideration of rationalisations or optimisations of activities.

Other variations of indirect models allocate revenue based on key performance indications (KPI's) using either historical data or prospective targets, or a combination. A notable issue with these models occurs where there is divergence in the KPI's used for internal revenue allocation compared with those used to derive external income, especially where the government represents the major source of funding. If this divergence occurs there is a potential that over time a conflict occurs where internal

units may be improving their KPI's however the central authority is not able to provide additional funding as the external sources are not growing with respect to the drivers of that income.

Table 2 - Indirect Budgeting Models

Model Group	Characteristics	Revenue and Costs	Budget Objective
<u>Indirect</u> (Formula budgeting, incremental budgeting, line item budgeting, planning programming and budgeting systems budgeting and activity based budgeting)	Straight through costs	Revenue or an allocation of funds referred to as 'revenue' – provided to balance out costs allowing a break even result or revenue may not be provided at all Costs – straight through based on approved spend. Generally no central taxes for costs such as the Executive Management Team, or for strategic initiatives are charged to operating areas as these funds are removed from the budget pool prior to allocating funds to other operating areas.	Costs to not exceed agreed budget
	Modelled	Revenue, or an allocation of funds referred to as revenue – provided based on formula related to performance indicators Costs – straight through based on approved expenditure Generally no central taxes for costs such as the Executive Management Team, or for strategic initiatives are charged as these funds are removed from budgeting pool available to other areas	Balanced budget, surplus or approved deficit to operating units

This chapter will explore the different types of budgeting models as described in the literature and will consider some of the apparent advantages and disadvantages of each model. The description of

models below will also form the basis of the following chapter that will examine the relationship (if any) of the budget model to organisational performance.

Formula budgeting

Formula budgeting (Goldstein 2012) is an indirect method, and applies a formula based on certain measures or KPI's to provide the operating unit income or to allow certain costs. The method can be used to provide income, such as a certain amount per student, in which case the expenses can then be estimated between categories as appropriate.

An alternative method of formula budgeting distributes funding for costs based on certain factors, an example of this may be staff costs allocated based on the number of students or IT costs allocated by the number of staff. Using this latter approach provides an outcome similar to line item budgeting (discussed later), in that the focus is primarily on budgeting each natural account code and less about the overall activities/functions and their associated costs. The formula may simply apply a funding amount per student or may be more complex applying proportionally more funding for more expensive teaching such as lab based courses.

The most complex form of allocation, using this model, applies varying amounts based on varying factors such as the number of staff, the number of students, the credit point load of teaching, the research output for the area or any number of other factors. Formula's often also contain a mix of leading and lagging indicators with a view to effectively allocate sufficient resources for current needs and potential future needs. Under this approach a number of different formulas can also be applied to different areas such as a formula related to teaching or another formula for research, or even another formula catering for physical equipment. It is important to note though, as described by McCready (1986) that as the formula or range of variables within the formula become more complex, this detracts from the benefit of the model being used as a means of communicating priorities, in that stakeholders may not understand the formulas or the likely outcomes of certain actions, causing an overall level of dissatisfaction with the budget to increase. A complex formula also has the potential to cause disengagement with the budget, particularly with stakeholders that are not accustomed to dealing with financial or numerical information.

Formula based approaches can help incentivise certain types of organisational behaviour in that the method can provide a detailed funding allocation based on detailed measures. Government funding in Australia (and in Germany) use a formula based approach to allocate funds to government funded universities. Funding is provided using specific measures including a mix of teaching and research measures. In Germany the formula based approach also serves to stimulate competition in the sector as the formula is based on a finite resource allocation which is then allocated to universities based on performance (Orr 2007). Government allocation formulas in Germany and Australia provide funding

based on various measures and incentivise performance in key areas. As such funding is then allocated based on the Universities performance in relation to its competitors and as the distribution pool is finite, this serves to reward institutions that meet and excel in certain elements. This approach also assists in more clearly articulating to organisations the activities that will be funded. Institutions may still choose to conduct other activities that necessitate external funding or require the initiative to be self-funded. In some cases the university may also choose to allocate surplus funds to initiatives not directly supported through the government formula based allocation. This approach also enables universities to have a degree of flexibility within their budgets (Ferrerri and Cowen 1993) and a majority of universities have access to flexible budgets at their discretion (Federkeil and Ziegele 2001).

Institutions receiving government funding through a formula based approach may also choose to allocate resources within the organisation based on the same formula. This approach allows a mechanism for the university to procedurally implement changes in government funding without the need for the central administration to absorb unfavourable policy changes in an effort to maintain internal stability. Orr (2007) notes that 86% of universities in Germany that received funding through a formula chose to use this approach and allocated funding within their institution based on a similar formula as provided by the government. Moll and Hoque (2011) note that from an Australian context, it is important that the internal formula is transparent and consistent with the formula the government uses to allocate revenue.

In cases where the university chooses to use the government formula for allocating internal budgets, the university strategy must also reflect the same goals as defined in the government based funding model (Orr 2007). This is also particularly important as the university budget is a key management tool that helps internal and external stakeholders understand the universities priorities (Balderston 1995), and having a budget that is contrary to the organisational strategy would be problematic.

In the Australian and German context, the university sector is strongly regulated and considered a quasi-government sector given that the sector receives the majority of its income from government sources and that the system is managed by the Department of Education with significant supporting legislative requirements (Government 2003). In these environments a formula based approach is used to allocate the finite pool of government funds and serves to emulate a market by allowing and encouraging stakeholder to compete for resources. Universities then compete for resources by attaining the highest level of each measure that then determines their level of funding.

Incremental or line item budgeting

Incremental or line item budgeting (Massy 1996, Joseph and Burke 2004, Goldstein 2012) is an indirect method that allocates small increases or decreases compared to the previous year. Incremental movements of line items such as salaries, consumables and travel, usually occur upwards to reflect inflation and increases in volumes. Some incremental models also allow for small funding decreases to

occur, although these are generally driven by budget participants noting that less funding is required, rather than with any link to decreased volumes or activity.

Changes from year to year are most often applied in a static proportion across the organisation or based on certain rules such as using the inflation rate or the increases in salaries as the incremental amount for additional funding (López 2006). A major criticism of the approach is often that incremental increases or decreases are not associated with corresponding changes in key operational activities. These rules can be specific and include a proportional increase for all categories and based on varying rates. In addition, varying rates can be used for profit centres and for other service areas within the organisation. Some models also cater for incremental changes by applying some basic criteria, such as student numbers or credit load, to determine changes from year to year.

A commonly sighted issue (Massy 2003, Libby and Lindsay 2010) with line item budgeting is that the focus turns to addressing upward justifications of each line in the absence of an appreciation of the underlying drivers of revenue and costs. Over time, under this approach, line items generally grow which supports an ever increasing list of activities, many of which may or may not be funded by government sources. When activities are funded for an extended period of time, without a corresponding external source, stakeholders receive an implied messaging of approval, acceptance and encouragement to continue and as this trend continues the organisation grows its cost base and list of activities, without a matching increase in external revenue – at which point it becomes difficult to stop the funding without causing significant disruption.

Responsibility centre budgeting / profit centre budgeting

Responsibility centre budgeting (RCB) is a direct budgeting method, also known as profit centre budgeting and revenue responsibility budgeting (Massy 1996, Goldstein 2012). This approach emphasises operational performance, the financial implications of that performance and strong accountability for achieving objectives. The methodology specifically emphasises that the management of both elements, operational management and financial management, must be available to be freely managed to achieve the academic mission of the organisation and to ensure that accountability can be clearly achieved. RCB is premised on the idea that the best outcomes can only be achieved when the area that generates the income is allowed to manage all aspects of operations and that they are best placed, compared to the central university, to make decisions on resource allocations and to balance priorities between the mission element and the profit based initiatives.

Each operating unit, be it one that generates external income such as a school or faculty or an internal income generating unit such as the IT department, is managed on the basis of charging a fee for service based on actual costs. Internal areas generate income by charging other areas for the services they provide, and the premise for this charge is that the costs of all elements of the operations must be transparent and available for all to manage, together with the mission of the university. With

transparency, operating units can also compare the charges for internal services to the charges for comparable services in the open market. This then allows meaningful discussions between areas about the costs for services and helps internal operating units stay focused on constantly improving the value proposition of their offerings (Parker 2013). Operating units that generate external income are usually expected to generate an agreed surplus, while internal service providers, under this approach, are expected to generate a break even result of revenue and costs.

Under this approach all revenue that can directly be attributable to a teaching unit (school, faculty or the like) flows directly to that unit. Income generated by units such as the internal IT department also flow directly through to that department. The revenue, for school or faculties, may include student fees, research grants and patents income, proceeds from the sale of assets, donations, gifts and endowment revenue. While for internal service areas revenue will include the charges they apply for the services they render to other operating units. The same level of transparency that is applied to income/revenue recognition is also applied to costs and this includes recognition of direct costs such as those covering academic salaries and indirect costs.

Indirect costs usually represent a large proportion of overall costs as these cover facilities charges such as building and property charges for other central services such as IT, library services, Finance or HR (Arnaboldi and Azzone 2006, Massy 2013). Building and property charges such as rent, maintenance and repairs are normally significant at most universities as the costs relate to the fact that large assets are maintained such as buildings, gyms, pools, car parks and other associated campus facilities. Property related charges are also often scaled for the quality or type of space (Balderston 1995). For instance, laboratory usage is usually charged at a higher rate than that of a standard room, and charges for a temperature controlled biological laboratory may be higher still. Central to the methodology is the concept of charging proportional amounts based on the actual costs, including the costs associated with ongoing maintenance, of the facilities being used. Budget authority holders can then make decisions on which spaces to use that will best assist them to achieve the operating units agreed objectives.

In turn, central areas usually charge for their services and units have an ability to easily compare that charge to rates available in the open market (Goldstein 2012). An example of this is the charge the University applies for the construction of an internal wall charged by the Property group. This could be compared to the costs associated with getting an external contractor to do the same work.

The other major categories of costs include centrally applied levies and taxes. Taxes are usually imposed by the central university authority to operating units to allow strategic objectives to be supported and to cover the costs of administrative areas in the university such as the costs of the vice chancellors office. Taxes are also commonly levied to raise money for large strategic investments into

specific programs or to build new facilities. Strategic support of programs usually occurs between areas that have a high intrinsic value to the organisation such as medicine and the sciences, which generate sizable research grant income, rankings and kudos, and other areas that have a low intrinsic value but a high financial value. Business schools are considered areas that generate large financial returns and are generally expected to deliver significant surpluses to the university, which are usually then redirected, via taxes, to research in other disciplines such as the sciences or engineering (areas that have a high intrinsic value).

Zero based budgeting

Zero based budgeting (ZBB) (Massy 1996, Goldstein 2012) can best be described as a direct model in which all revenue and costs flow through to the profit centres. The method seeks to critically assess and prioritise each budget, for each program or operating unit, each year without any preconceived notion of providing funding or providing an incrementally adjusted amount compared to the previous year (Balderston 1995). Under this approach each budget unit needs to justify its position, in entirety, each year in order to secure funding and this is usually achieved through a detailed process including reviews of historical and forecast data and key metrics related to service volumes.

A budget is a form of contract between the operating unit and the central governing body. In exchange for a monetary allocation the operating unit undertakes to perform specific tasks, such as teaching, research, administration and outreach (Richard J. Meisinger and W.Dubeck 1984). In more evolved systems, measures and commitments are also required from the operating unit for the quality of outputs of particular tasks, such as the quality of teaching or the volume and type of services performed. ZBB is well suited to enabling budget participants to link operational performance metrics to financial resource requirements given the process itself necessitates a rich source of organisational metrics.

The process employed with ZBB usually entails a number of detailed submissions to various members of the organisation or executive committee. As justification is required, the amount of work that must be completed in preparation by each unit is significant, and standard templates are often used to ensure information between areas is comparable. Low level decisions often occur within smaller groups of finance staff, while the more significant decisions are deliberated upon by the executive committee. These deliberations can take many forms and may require ranking to be applied to each submission concluding in a process to determine budget approval amounts. Often other steps are incorporated with respect to certain types of decisions to speed up the overall budgeting process such as delegating certain decisions to other committees or business units. However, delegation is generally limited as the more delegation that occurs the more disjointed is the final result including the level of consistency between different approvals of different components, compared to the overall

submission. Delegation usually occurs, with strict rules and for minor items such as budgets for stationery, repairs and maintenance or similar categorises.

This approach may work well for smaller organisations or where ZBB is employed on a rotational basis through the organisation, selecting different operating units to go through a detailed review each year, on a rotational basis every few years. The rotational approach allows a thorough review of a particular area and an examination of the budget related to inputs (Kong 2005), activities and outputs and does so in a manageable way by only looking at certain operating units per year rather than the entire organisation. The organisation could then aim for an entire review of all areas over, say, a three or four year period. Where a rotational approach is adopted it also becomes imperative to understand the possible outcomes of the review, with the potential for funding increases or decreases, and this must also then be integrated with the organisations budgeting approach more generally. Practically though, within universities, unless a major change in structure or strategy has occurred that has real impacts to activities performed, significant changes to operating units are unlikely. The ZBB process to review performance metrics helps ensure a disciplined approach to collecting, measuring and analysing operational data is taken. In addition, management diligence is required to relate these operating metrics into financial resource requirements. Typically metrics include the number of recruitment/employment requests (to allocate the costs of the HR function), the number of staff (to allocate the costs of IT support), or the number of journals raised (to allocate the costs of central finance support) (Williams 1981). The process to review operating KPI's also sends a clear message to stakeholders regarding the expectations from the university to measure and improve performance, emphasising the point made by McCready (1986) that the practice itself serves many purposes.

The premise of a detailed review of each unit, much in the same manner as described through the process of ZBB, may also be employed with other budgeting techniques such as formula budgeting, incremental budgeting or responsibility centre budgeting. The outcome of which may allow for subtle improvements to be made to the existing funding model to better suit the needs and objectives of stakeholders in different operating units or to alleviate obvious model failures when applied to specific units. Only organisations that have well developed internal measurement systems can use this approach, otherwise the information gathering step becomes onerous and detracts from the budgeting process. These systems must also contain rich data that can easily be linked to financial resource requirements and have the ability to forecast future service volumes and costs.

Planning, Programming, and Budgeting Systems

Another indirect approach is referred to as Planning, Programming, and Budgeting Systems (PPBS) (Richard J. Meisinger and W.Dubeck 1984, Brock 1996, Goldstein 2012), also referred to as Activity Based Budgeting (Kleiner 1995). This approach emphasises an objective driven budget and the resources required to meet those objectives. Conceptually this method also differs considerably to the

way most organisations operate in which the delivery of a program usually spans multiple organisational units. Looking beyond these operational units and at the objectives is a worthy pursuit as it represents a more intuitive approach, especially in a centralised model where it is easier for decision makers to understand the relationship between budgetary inputs and objective outputs (Kong 2005). The approach also works well with activity base costing models (Arnaboldi and Azzone 2006) in that programs can be defined as activities and can describe the income and costs associated with say a science degree or an arts or business degree. If costs are described holistically, including charges for space and all other direct and indirect costs, the output is a fully loaded (including all direct and indirect sources) business case that shows all revenue and costs.

PPBS rely on exceptional internal information systems that can provide data on a program related basis and between different operating units. This applies with respect to objectives and the ongoing monitoring of objectives together with good cost allocation tools that relate and group costs to programs. If these systems cannot provide the information in an agreed manner, the method becomes problematic to implement and may result in each unit creating a system to do this, which creates an inherent risk associated with duplication and issues with data integration and consistence (Balderston 1995). Many organisations are able to build a separate business case (in excel or similar spreadsheet based tools) for strategic or unique initiatives that describe the objectives, mapped to revenue and costs, although often difficulties arise when systems are not able to support the consistent retrieval of comparative information highlighting actual performance to planned performance (Kong 2005).

With a system in place to track objectives and costs, PPBS then relies on objectives to be set and agreed between stakeholders, especially those servicing different aspects of the same value chain. Objectives are set through a process of collating a multitude of KPI's and these then being prioritised and collated into a subset of agreed program objectives. Objectives that span multiple business units to deliver a single service should consider the relevant metrics at each step of the delivery value chain (Kurian 2014) recognising that, for the desired outcomes, performance at each phase needs to contribute in an agreed manner, with agreed volume and quality output measures, for the service to be delivered in its entirety. The agreed plan called the Program plan, reflects the KPI's and prioritisations, and forms the basis for the preparation of the program budgets. For the approach to work efficiently, Program Plans should specify the objectives and the main organisational units that will contribute towards the achievement of the objectives. The Plan usually includes objectives over a multi-year period, facilitating medium term planning and in some cases long term strategic planning. To create the Plan a deep understanding of the organisation is required, together with how all the organisational components contribute to achievement of the overall objective. To allocate the appropriate resources to each organisational unit, the objective must be split between each organisational unit. For example if objectives are set for the Bachelor of Science program (the Plan), objectives and resources must also

flow to each operating unit that contributes to the objectives of the Bachelor of Science program. The contribution of a student administration centre, or the contribution of the library, to the Science objectives needs to be defined.

This approach has a benefit in that resource allocation refinements can be made within units that are contributing more than expected towards the overall objective, and in the long term allows entire units to be closed or expanded. As an example, if the library is found to contribute little to the Bachelor of Science program, over time, it would receive less and less funding.

One of the major complicating factors of this approach is the process used to allocate budgets to each operating unit and in the correct fraction, to enable units to achieve their objectives. For instance a program objective aimed at improving the graduation rate for engineering students will span other departments that teach into the program such as maths, physics, and chemistry, and within support services units such as student counselling. If these are separate departments the question becomes how much does that unit contribute to the total benefit and what quantity of resources should be provided to each area to help ensure the objectives are met. This becomes a complex discussion despite the seemingly simple objective. This complexity increases with the number of programs, and may work well when the program numbers are low, but for large institutions with hundreds of programs, the task is exceptionally difficult.

The theoretical benefit of focusing an organisation towards objectives, rather than on the internal constructs of itself is appealing, however the methods currently available to allow implementation of such approaches are limited and work well only in small organisations. Many organisations simply choose to budget with organisational units although have a number of cascading or associated operational plans, in separate operating units, that help decision makers assess whether goals and objectives have been met (Richard J. Meisinger and W.Dubeck 1984).

In addition to budgeting approaches that encompass entire operating units, a number of more specific models are available that are either initiative based or performance based (Goldstein 2012). These methods are similarly conceptually to investment appraisal methodologies (Pike 1988) such as a Net Present Value (NPV) technique or IRR's, where inputs, activities and outputs are assessed, on a discounted financial basis, to determine whether to pursue the opportunity or to allocate resources elsewhere. Funding in these situations may either be categorised as direct or indirect in that these initiative specific models can work with any other more general budgeting model or may even operate in addition to an existing budgeting model. These methods may be used to plan for specific initiatives within a larger business unit that maintains its own budget and are useful for specific initiatives.

Using these methods it is imperative that all known costs are factored into the budget with specific attention to other support functions that may also be required to contribute to the success of the

initiative. These support functions may include central student administration, marketing, Information Technology or Finance.

Accountability

The concept of management accountability in the university sector has evolved considerably over the past decade in Australia, and occurred much earlier in the US with the advent of a more decentralised system (Parker 2013). The Australian higher education system is currently regulated for the fees charged to undergraduate domestic students, although this regulation does not extend to how the institution is actually required to spend those funds. University management is able to act autonomously in managing the revenue and the operations of the institution while fulfilling the relevant government legislative requirements around the concept of standards and quality (López 2006, Lomax-Smith 2011). Although financial management of universities is autonomously managed, at the institution level, universities are still subject to a compulsory annual audit to examine the financial aspects of reporting and financial processes (Auditor-General 2015). Audited reports are presented to parliament and aspects of performance and or non-performance, to relevant accountings standards and requirements, are reported and published. Public universities are also required to publish their accounts which includes the audit report.

At the institution level, accountability for financial outcomes may be centralised or decentralised (Gonçalves Veiga 2015), and are often linked to expected operational (non-financial) outputs or outcomes (Kaplan 1996). A centralised structure is one where management control primarily resides within a small group of people, at the top of the organisational hierarchy, as opposed to a decentralised model that utilises a wider variety of expertise, spread between various sub-units within an organisation, and within staff at lower levels of the organisational hierarchy. In organisations that maintain highly centralised structures for university management including budgeting, management accountability is usually for inputs and processes, while in organisations that have decentralised management, accountability usually shifts towards outputs and outcomes (Clarke 2000, Mahboubeh and Mohammad Reza 2012, Parker 2013).

The budgeting model used in an organisation must be consistent with the accountability and governance structures within the university and any level of asymmetry or contradiction between the elements (budget model and governance structures) is likely to result in management disengagement and poor organisational performance (Williams 1981, Kong 2005). For instance, a line item budgeting approach which is usually applied at universities that have centralised management, focuses on the inputs required to deliver certain outputs, taking a strict view of the budgeting information required by natural code and with an inflexibility towards relocating spend between different codes. Under this approach reallocating budget savings from (say) 'travel' to 'salaries' is generally not allowed as the focus is on the precise level of resources required by natural code more so than on the outcome. The

key premise behind this approach is that central management has the ability to define the precise inputs, by line item, and defining this will lead to a better organisational outcome (Massy 1996) as opposed to those actually involved in the work of teaching and or research, and that central management is best placed to make these decisions. This budgeting approach suits a centralised management structure, naturally benefiting and supporting organisations that choose to separate accountability for inputs and accountability for outputs, between different facets of the organisation.

Universities that maintain accountability for inputs and outputs together (a decentralised management structure) within the same operating unit (faculties or schools) usually benefit from a budgeting model that is profit based, as this type of model allows for a degree of flexibility in managing inputs to achieve the desired level of outputs (Goldstein 2012), in the most efficient manner. The main assumption is that decisions for inputs and outputs are best made by those engaged in the actual work of teaching and or research. A profit based budgeting model, as opposed to a line item based model, provides internal incentive mechanisms that reward innovation (Ferreri and Cowen 1993), and hence represent a better tool to support universities with growth strategies (Wildavsky, Kelly et al. 2011). The benefits of a formula based budgeting model more closely align to that of a profit based approach when there is a high degree of transparency and understanding of the allocation formula, and when the correlation between internally allocated funds to faculties and schools (formula based income), to externally received income from government sources or student fees, is high. If the formula used to allocate internal funds within the university does not correlate highly with the funds received from external sources, a formula based approach then more closely aligns to supporting a centralised management structure.

Procedural and mechanistic problems arise within an organisation within the context of accountability and the budgeting model when the overall governance framework contradicts the mechanisms of the budget model that is used (Schick 1985). These contraction may be explicit or implicit and the impact is that the budgeting model then becomes an ineffective tool in supporting organisational goals. Historically, in periods where there has been little policy change impacting the higher education sector budget models remained stable, were consistent with governance frameworks which also remained stable, and together the structures supported the overall organisational strategy (Kenny 2009). However, in the current period of high levels of policy and funding uncertainty (in Australia and globally) budget models have also been changed to reflect new organisational goals (Christopher 2012) and the uncertainties of the external environment. Ezzamel, Robson et al. (2012) explore this environment referring to it as one characterised by a tension between the new business logic, prevailing professional logic and the governance/accountability logic and describe these three forces in the context of changing government policy, as an external factor, and the impacts on budget holders within a university, as an internal factor. They conclude that the three elements (business, professional

and governance logic) must be transformed together rather than individually to create and maintain a budget model that supports organisational strategy and to enable the organisation to be flexible to deal with changing government policies. Christopher (2012) also describes this relationship as the tension between corporate and collegial and autonomous cultures and emphasises that this conflict has increased over time with the advent of funding uncertainties and increased competition. Simply changing the budget model without changing the governance structure is likely to result in organisational conflict, stakeholder disengagement with the budget and consequently a budget that does not support organisational strategy.

The question then becomes of which element to change first, strategy or structure, as described in the seminal work by Miles, Snow et al. (1978) that concludes that organisations should adopt distinct strategies and adapt their internal characteristics (such as the budget model and process) to these strategies. Andrews, Boyne et al. (2009) extend the work to include public sector and not for profit organisations, and find some similarities to Miles et al. that strategy formulation in these sectors is more complex with accompanying complex structure and that more consideration must be given to supporting the process, emphasising the need for them to also be consistent with the strategy and structures.

Within different budgeting models and with differing university governance structures, management accountability can reside in different areas within the financial statement(s) (López 2006). Broadly the notion that is expressed in agency theory with respect to accountability (Van Puyvelde, Caers et al. 2012, Carlitz 2013), is that managers should be held accountable and evaluated based on what they can control (Antle and Demski 1988, Fung 2013, Kingston and Weng 2014). Management accountability, from a financial perspective, can reside with financial statements such as the profit and loss statement, the balance sheet and or the statement of cash flow. In commercial organisations management is often held accountable for certain results in each statement, allowing a balanced measure of organisational performance (Kong 2005) and incentivising management to take a balanced approach to organisational performance (Kaplan 1996). For instance, within a profit and loss statement, management may be held accountable to achieve a certain dollar gross or net profit, or for a certain percentage such as the gross profit percentage or the net profit percentage. Within a balance sheet, management may be held accountable for net assets and within a cash flow statement management may be held accountable for the total surplus or deficit amount of cash on hand. From a university context accountability for results in all three statements resides with the CFO, including accountability for the budgeting process and elements related to good financial governance. The financial governance framework then assigns accountability for results across the organisation between faculties and schools and administrative units and managers in those areas then become responsible for achieving agreed results using defined processes. The framework also describes the

particular financial statements that management are held to account for, and this is usually at the profit and loss (P&L) level, within most universities.

The level of accountability, at the broadest level at universities and organisations generally, is to achieve the agreed budgeted result, be it in the P&L, balance sheet and/or cash flow statement (or to achieve an agreed result within all three statements). Faculties, schools and administrative units are most commonly held accountable for a P&L result (Massy 1996, Goldstein 2012), while the CFO is held accountable for results in all statements. The effect of this and the context of the budget can only be understood with respect to the budgeting model used. For instance, universities that use a line item approach generally hold managers primarily accountable for the results of each line and secondarily to the results of the P&L in totality. While using a profit based budgeting model accountability for faculties and schools is usually to achieve a certain surplus, which is returned to the centre, and for administrative offices to spend in accordance with their budgets (Varlotta 2010).

Within the P&L, accountability can differ between organisations depending on whether it is measured at the gross surplus/deficit line or at the net surplus/deficit line, analogous to the measurement of financial return after considering direct income and expenses (gross profit level), or consideration after direct, intermediate and indirect sources (net profit level) represented by the area of accountability 3, 5 or 8 respectively (in Figure 5 - P&L Structures with Accountability Points). Intermediate sources refer to those elements within an organisation that have clearly associated cost or activity drivers (Kleiner 1995, Arnaboldi and Azzone 2006, Sellers-rubio, Mas-ruiz et al. 2010), although for structural reasons or for the fact that these costs are not as direct as those compared to those of delivering the core functions of teaching and research, are midway between direct and indirect costs. Common examples of these 'intermediate' costs include the costs for delivering IT services that are highly correlated (driven by) by the number of students and staff at a university, while the HR costs would be highly correlated to the number of staff in an organisation. Indirect costs are those that usually represent pure administrative functions at universities, such as the cost of the vice chancellors office or the costs for the deputy vice chancellor – research portfolio – and represents sources that have far less correlation to staff or student numbers compared to the direct and intermediate sources.

Universities that use a line item budgeting approach usually hold management accountable at the direct expense section, areas of accountability '2' (Figure 5 - P&L Structures with Accountability Points) and more specifically to the precise expenses in that category (Varlotta 2010). Where a formula based approach is used accountability is at point 3 (areas of accountability), accounting for direct sources of income and expenses. Certain profit based budgeting models also hold accountability at point 3, while more common accountability is at either point 5 or 8. Using a profit based model, accountability may also be held at point 3 although this approach would be less common as the majority of an organisations costs reside within intermediate or indirect as opposed to direct costs. This assumes the

intermediate areas are structurally placed outside the faculty/school organisational hierarchy and where, say, HR staff reside within the faculty/school, then measurement at point 3 would include such costs as ‘direct’ costs. Universities (in the sample, to be discussed later in the thesis) tend to have differing levels of centralisation and decentralisation (Ferreri and Cowen 1993) of functional areas, and thus where a function listed as indirect (Figure 5) forms part of a faculty or school, the costs are then considered ‘direct’, and over time, with structural changes at an institution, the categorisation of direct, intermediate and indirect also changes.

Categorisation of Income and Expenses		Areas of Accountability Budgeting Models	
	INCOME		
Direct Income	Student Fee Income		
Indirect Income	Other Income		
	Total Income	1	Profit based and some formula based models
	EXPENSES		
Direct Expenses	Salaries		
	Other		
	Total Direct Expenses	2	All model types
	Gross Surplus/Deficit (gross profit level)	3	Depending on the detailed model specifications, can be here or at (5) below
Intermediate Expenses	Expenses for Central Services		
	IT		
	HR		
	Marketing		
	Finance		
	Total Intermediate Expenses	4	Usually profit based models
	Gross Surplus/Deficit (gross profit level)	5	Depending on the detailed model specifications, can be here or at (3) above
Indirect Expenses	Indirect Expenses		
	Executive Salaries (VC, DVC's, CFO, COO, etc)		
	other Central Costs to run Exec Portfolios		
	Total Indirect Expenses	6	Some profit based models
	Total Expenses (Direct, Intermediate and Indirect)	7	Some profit based models
	Net Surplus/Deficit (net profit level)	8	Some profit based models

Figure 5 - P&L Structures with Accountability Points

Critique of models

Budgeting models each have specific strengths and weaknesses that arise due to design characteristics, and as a result of the way the model integrates with the governance framework within each university. The critique to follow aims to objectively highlight a number of significant strengths and weaknesses of each model as outlined in the literature, and together with the mechanistic description of each model in the previous section, and will provide a comprehensive summary of each budgeting model.

Formula budgeting is considered equitable in that the same formula is usually applied to all areas, providing transparency and showing the unbiased nature of the allocation method. If the model contains too many special case formulae, this concept of equity can be damaged as can be the value of the models relative simplicity. Also where the internal funding drivers differ significantly to the external funding drivers, over time, the organisation can evolve in a manner that achieves sub optimal external funding while having to grow internal funding, eventually placing significant pressure on the organisation. With this type of model, the gap between external funding and internal resource allocation (the allocation of external revenue to operating units) is managed by the central

administration or central finance office. However if the gap becomes large and funding shortfalls arise, the university is forced to revert to drastic measures to address the shortfalls (Massy 1996). If shortfalls are persistent the university usually cuts the level of funding and/or changes the budgeting model itself to help address the issue.

Formula based approaches tend to be stable over a long horizon due to the apparent equity of the model, as such long range planning is enhanced due to this stability (assuming external funding also remains stable, which is often not the case in Australia and many other countries). Although a major disadvantage occurs if the formula is incorrectly specified and results in areas receiving over or under funding. Another major disadvantage is that this funding approach implicitly encourages the status quo with respect to programs with revisions or cancellations to existing programs dis-incentivised, as is the creation of new programs. If funding is provided on historical metrics, this effect is further intensified.

The other major disadvantage of this approach, as with line item budgeting, is that there is a tendency to focus on the change, from year to year compared to the base case, rather than on an in-depth program or project analysis including a review of whether the initiative should continue or cease. Each year's budget generally progresses with an assumption that what was done last year will continue into the future and that there will only be additions to the current offerings. This effect intensifies and reinforces a culture of budget ownership and property rights (Horne and Hu 2008, Johnes and Johnes 2009, Massy 2013) over time. As with all models there will be inherent flaws, and these flaws become more pronounced over time resulting in the need to respecify the formula or to change the approach all together.

Often funding decreases are avoided by budget authority holders at departments and faculty levels, arguing that maintaining base funding, irrespective of small movements upwards or downwards, is important to maintain consistency and quality of delivery. However this point is difficult to overcome and reconcile when external funding is reduced because of lower activity and when internal participants still request similar or increased funding irrespective of lower volumes of students or activity. The challenge of meeting these perceived gaps is then put forward to university management to absorb and correct for the effects of downward movements. Needless to say, few central finance offices have the will or capacity to provide such financial cushioning, and if they are able to provide this support it is unlikely that this support can be provided, nor should be encouraged, in the medium to long term.

An Incremental or line item budgeting approach is advantageous in smaller organisations (Richard J. Meisinger and W.Dubeck 1984) and the effectiveness of the approach becomes more difficult to manage as the size of the organisation increases. The approach is often used in organisations or

environments where the cost of data gathering and analysis is high or the results unreliable. In these situations maintaining a stable budget provides simplicity, irrespective of the underlying difficulties in taking a more data driven approach.

Organisational decision making represents a complex set of connected and sometimes unconnected negotiations. This complexity increases with the size of the organisation. When multiple 'players' are negotiating and working with the same central service providers (e.g., HR, Student Services and Finance) to achieve an objective, the only method in which progress can be made is with incremental decisions. This is because each decision regarding resource allocations impacts service delivery to many related areas, and to ensure that complete disruption does not occur, decisions can only generally be made at the margins. In this type of environment, the budget model also then reflects the operational aspects of the organisation, and highlights a case where an incremental budgeting approach appears reasonable. However the subtle explanation of the issue masks the significant disadvantage in this approach which is that incremental movements are usually upwards and additive. Changes seldom take into account movements or functional savings downwards. Over time, constant movements upwards results in a feeling of budget ownership and an instinct to protect base budgets, which year on year, eventually leads to significant resource inequalities and inefficiencies. Efficiency is often quoted as the major benefit of this approach, although over the long term, the approach is shown to cause systematic inefficiencies.

From a political aspect, the incremental budgeting approach assists in maintaining an environment where only small operational and budgeting changes occur. In situations where more complex operational changes occur it is also common under this approach that the budget does not necessarily reflect the significance of the change (Andersen and Mortensen 2009). This aspect and budgeting approach has also been noted to inhibit strategic decision making and resource allocation as decisions are based on factors that limit the impact of change rather than those that may be best from an organisational perspective.

The incremental approach is often described as the most efficient model as it is easily understood and applied from year to year (Varlotta 2010). The model assumes, motivates and rewards the organisation to keep programs relatively static from year to year. The model's efficiency is often justified by arguing that the overall organisation factors such as staff numbers and student numbers remain relatively stable from year to year. This argument does not address movements of staff or students within different parts of the organisation or between faculties, only situations where the overall organisational movement is stable. An example of this could be the movement of students away from science disciplines towards business and law, where the student load for the university in total remains relatively stable although the distribution of that load between different teaching areas shifts. This also highlights one of the key underlying principles of this model which is that the funding amounts of

the previous year are assumed to be efficient and effective and represent an acceptable base to which increases or decreases can be applied. Although as can be seen with the example of students moving from science to business or law, the science areas would continue receiving funds from year to year, which may be increased by an inflation factor or by a more general organisational growth factor, irrespective of the decline (Massy 1996). The model remains efficient and simple although may also be inequitable in allocating resources, based on merit, with the current example as a case in point.

A benefit of this approach is the ability to apply different level of increases or decreases to various different budget lines with relative ease or to apply different increases to different faculties/schools. If the organisation knows that salaries will rise by say 4%, then this factor can be applied to all salaries. If all other costs are expected to increase by 2%, then this can also be factored into the budget (Goldstein 2012). And if the amount for university repairs and maintenance is likely to be lower, then an overall reduction of this item can be applied to all areas. This in effect, further reduces the time budget participants need to spend to construct the budget, as much of it will be built based on central assumption.

Without question the major disadvantage of the model is the fact that all movements upwards and downwards occur on the initial budget base, without an examination of the validity of that base to begin with (Balderston 1995). The model also implies a lack of an appreciation for the organisation to engage in structured planning as the funding model clearly drives standard incremental upward and downward movements, rather than purposefully supporting a change in organisational strategy. The model not only encourages limited planning but also implies that detailed business analysis is not required, with the assumption that the previous year's allocation was efficient and effective. There are many disadvantages of this thinking as noted above, although the approach does reduce the level of organisational conflict largely because all areas are treated equally.

Massy (1996) notes that the incremental approach is often pursued by senior finance staff as they perceive that a centralised approach, managing costs to particular line items, yields the highest levels of efficiency. 'By controlling everything, administrators believe they can ensure that resources will be used effectively'. The approach is beneficial for small organisations or for organisations that are in a period of transition or which require funding stability. However adopting this approach, over time, will contribute to reinforcing a culture (Ferreri and Cowen 1993) of limited innovation and will further widen gaps between demand at a program level and organisational funding.

The Responsibility Centre Budgeting approach creates a nexus between academic pursuits, revenue, and costs and facilitates a strong management culture within the organisation as the only manner in which objectives can be reached is through thorough planning, organising, monitoring and management of resources and allocations. Maintaining financial accountability is usually accompanied

by extremely strong and clear management expectations regarding targets towards central university objectives. A common financial objective reported in the literature is the need to generate an operating surplus. If the teaching area has been assigned a target surplus of 5%, all operational aspects must be focused towards delivering academic outcomes, within the envelope of available funds, to achieve that surplus.

The approach does have its flaws and the focus on financial outcomes compared to academic quality is most commonly sighted. This extends to the problem of externalities (Lohmann and Lombardo 2014) where an area chooses to teach in a similar discipline to an existing discipline. An example of this could be the engineering school deciding to teach maths as opposed to using the mathematics department to teach the subject. If the decision was motivated by financial objectives then this is problematic, however if driven by an improved outcome then this may be seen as acceptable. Alternatively, it may highlight that the maths department are not focused on delivering the outcomes expected by stakeholders. The model is premised on all internal areas servicing all other areas in the best manner, and represented by value for money. The other major disadvantage of this model, as sighted in the literature (Richard J. Meisinger and W.Dubeck 1984, Massy 1996, Mensah and Werner 2003, Goldstein 2012), is that it is costly and time-consuming to maintain, requiring good data on matters such as space and also requiring significant numbers of accounting staff to manage the model.

Zero Based Budgeting's major criticism relates to the length of the process (Goldstein 2012). This is often addressed by including other process steps or delegated authority levels, however this too has known issues. If the decision making authority is too broad, this results in disjointed approvals between groups, which may also result in an approved budget that lacks organisation wide cohesion. In response, many proponents argue that the various levels of decisions and rankings processes allows the organisation and executive to gain a broad and deep appreciation of the costs and benefits of each initiative, allowing a more meaningful allocation of resources throughout the university.

One method to overcome the risk of a disjointed budget is for the organisation to ensure it has a well-articulated and clear strategic plan and one that will assist decision makers allocate resources in a cohesive manner (Parker 2013). A clear strategic plan is a pre-requisite under any budget model, although the need and importance is increased with this approach as decisions are made each year that are independent from the previous year, and decided upon by stakeholders from across the organisation.

Another criticism of this approach is that an organisation usually has commitments with students in existing programs or staff contractually obligated towards certain grants or research that precludes a major change from year to year. It is not practical to stop a degree while students are still completing

a multi-year program, however it may be possible to make the decision to reduce funding gradually over a period of time and reallocate those resources elsewhere.

The Planning, Programming and Budgeting Systems approach has a benefit in that resource allocation refinements can be made within units that are contributing more than expected towards the overall objective, and in the long term allows entire units to be closed or expanded. As an example (Balderston 1995), if the library was found to contribute little to the Bachelor of Science program, over time, it would receive less and less funding. The major benefit of the approach is that budgets, using this approach, are constructed using objectives and output service measures that are then linked to financial resources requirements, allowing the budget to be understood by a broad range of stakeholders rather than simply those familiar with finance and accounting methods.

One of the major complicating factors of this approach is the process used to allocate budgets to each operating unit and in the correct fraction, enabling units to achieve their objectives. For instance a program objective aimed at improving the graduation rate for engineering students will span other departments that teach into the program such as maths, physics, and chemistry, and within support services units such as student counselling. If these are separate departments the question becomes how much does that unit contribute to the total benefit and what quantity of resources should be provided to each area to help ensure the objective is met. This becomes a complex discussion despite the seemingly simple objective. This complexity increases with the number of programs, and may work well when the program numbers are low, but for large institutions with hundreds of programs, the task is exceptionally difficult (Williams 1981, Richard J. Meisinger and W.Dubeck 1984).

Section 2 Conclusion

There are many budgeting approaches that can be used in an organisation. Some methods suit large organisations and other methods suit smaller organisations. Certain methods will work better within a more controlled governance framework (Parker and Kyj 2006), while others will work better in more open and inclusive environments. Different methods also have varying data requirements and some methods inherently are more complex than others, as can be seen from the models described (Erosa 2012). The next chapter considers five university budget models, discusses them in detail and categorises them according to the literature.

Section 3 – Review of Budgeting Models and Performance Analysis

Introduction

This chapter will examine the budgeting models used at a number of Australian Universities by selecting a sample that includes natural variation to better understand the relationship between budgeting models and organisational performance. This type of analysis has not been done before in Australia or internationally and represents the first attempt to make a comparisons between budgeting models and performance. A limited set of literature is available that takes a case study based approach to budgeting and this work centres around describing the advantages and disadvantages of particular models or around the political dimension of budgeting models within universities (Ferreri and Cowen 1993, Brock 1996, López 2006, Orr 2007, Marcel and Herbst 2009, Moll and Hoque 2011, Lohmann and Lombardo 2014). Through the data gathering phase it was also noted that some universities simply did not have information describing their models with the information residing with the finance staff. A sample based approach provides an ability to focus on a diverse set of universities, and ones that maintain adequate information and documentation regarding their budgeting models.

The budgeting models at each university in the sample are examined together with publically available financial and performance data to conduct a comprehensive analysis. The period 2003 to 2013 is used to analyse performance as it contains the most up to date data at the time of compiling this work. The Australian Government, through the Department of Education and Training, maintains detailed financial and non-financial metrics on universities and this data, over a 10-year period, is used to describe university performance.

Universities Selected

The first step taken to gather data on university budgeting models is to compile a list of Australian Universities. Thereafter each university web site will be reviewed to determine whether pages existed describing the overall budgeting approach. In doing so it was found that the information either did not exist on the site or was protected within the organisational intranet. A more direct approach was then taken and contact was made with the Chief Financial Officer or most senior finance person at each University requesting details of the budgeting model. Ten responses were received.

A reviewing of the information supplied highlighted the varying degrees of budgeting information available at universities. The range of information provided in response included glossy 'annual report' styled budgeting booklets, to basic memo styled documents containing rudimentary estimates of income increases and cost growth rates per natural account code (e.g., salaries, travel, other expenses). Responses showed that often a simple incremental budgeting approach was employed in which case the budget process and guidelines were brief. The older and more established universities tended to have more information regarding the budgeting model and also used budgeting models that

were either profit centre based models or models that allocated funding through a performance based algorithm using leading and lagging teaching and research based measures.

Each model will then be reviewed in detail and a sample selected ensuring varying geographic locations including the states of New South Wales, Queensland, Victoria and South Australia (Table 3 - Table of sample universities, locations and type of budget model). The universities selected are listed in the table below:

Table 3 - Table of sample universities, locations and type of budget model

University Name	Location by State	Budget Model Employed
University of Melbourne (UMelb)	Victoria	Profit centre based
University of Sydney (USyd)	New South Wales	Profit centre based
Macquarie University (MQ)	New South Wales	Formula based
Griffith University (GU)	Queensland	Profit centre based
University of South Australia (UniSA)	South Australia	Formula based

Two types of broad budgeting models were used within the sample; a profit centre based approach and a formula based approach. Even though the models were within the definition of the two classifications, the models varied significantly with respect to the level of detail within each. The other major point of variation was the level of accountability within each model for financial measures including revenue, cost, gross margin (gross profit) or net margin (net profit).

Three of the universities in the sample use a profit centre based approach while the remaining two use a formula based allocation approach. MQ and UniSA use a formula based approach, while GU, UMelb and USyd use a profit centre based approach. Of the universities that use a profit centre based approach, only GU was not a large Group of Eight (Go8) university. Significant variability was also found within each model with respect to the way in which the models operated including the manner in which central costs such as the Vice Chancellors office were allocated. The next section will describe each budgeting model within the sample.

Description of budgeting models used within the sample

Macquarie University

Macquarie University (MQ) is located in Sydney Australia, was founded in 1964 and is 50 years old. In 2013, the most recent year within the sample period, the Equivalent Full Time Teaching Load (EFTSL) was 20,499 and it earned \$745,000 in revenue from continuing operations. Using the Academic Ranking of World Universities 2013 (ARWU) compiled by Shanghai Jiao Tong University, Macquarie ranked internationally within the 201-300 band and nationally (in Australia) at 8-9.

The budgeting model used over the period was a formula based approach as is referred to as the Faculty Funding Model (FFM). All student revenue is received at a central level as are all components of trailing government research infrastructure payments ('area of accountability' point 1, in Figure 6 below). Approximately 25% of the revenue is passed through to Faculties (point 6, in Figure 6), via the FFM, with the balance of the funds used to pay for central student services and centralised overheads (point 5). Costs for maintaining operations of centrally funded functions such as the Vice chancellors Office, office of the Chief Financial Officer, Information Technology and Human Resources are initially removed from the total fees component leaving an amount available for distribution to the teaching Faculties.

This fixed amount is then distributed to the faculties through a model that proportionally allocated income, weighted 87% towards teaching metrics and 13% towards research metrics. Teaching metrics include EFTSL for all undergraduate, postgraduate coursework and postgraduate research and an additional amount for all postgraduate research completions. The additional amount for postgraduate research completions is consistent with the additional funding provided to all Australian Universities for research students that have completed their studies successfully. The EFTSL in each discipline (Business, Science, Engineering, Arts and Medical related areas) is then weighted according to the cost of delivering those programs. For example, a standard business course is weighted by a factor of 1, and a standard undergraduate science subject is weighted by a factor of 1.6 accounting for the additional costs to deliver laboratory based science teaching.

The 13% research pool is allocated in two sub components - 78% is allocated based on the dollar value of historical grant successes, and the remaining 22% of the pool is allocated based on historical numbers of publications.

The model allocates internal income independently to the amount of fees charged to the students, and as such no additional benefits or incentives are given for attracting students to high fee earning areas or attracting international students who pay higher fees. This independence is noted in Figure 6 denoted with a 'green line' that highlights the separation of external income received from the

government and student fees compared to the amount actually allocated to faculties using the budget allocation formula.

Part of the fees collected include provisions that are used to support the creation of strategic pools to support investment in teaching and research. Two internal schemes are available to support the purchase of equipment for teaching and to support the purchase of research based equipment. These schemes provide funds back to Faculties based on the attainment of certain objectives and are allocated on a competitive basis. In addition, a number of other schemes are available to support internal fellowships that allow a research focused appointment for a period of two years.

The overall University budget including the result in the Income statement is managed by the central finance office (point 9), and under this budgeting approach defined surpluses are not required at each Faculty as funds provided already exclude costs for central services and facilities. However, importance is placed on the faculty's commitment to manage the budget to the agreed bottom line (point 8). The agreed bottom line may be a surplus, a balance budget (zero bottom line) or an agreed deficit. Variability is managed at the central level and this method also requires an ability to absorb variability centrally to cater for fluctuations in fees or with respect to the amount provided by the government to the university.

The model is also complex in that a separate internal formula is used to allocate income compared to the manner in which the income was earned from external government sources. Transparency is also low given the nature of the model as it provides funding based on performance of the faculty and based on the relative performance between faculties. In this situation improved performance does not necessarily result in increased funding, as other faculties may have performed proportionally better, and this sends confusing performance signals to management (Carlin 2004).

Over the period a number of adjustments were made to the funding model. These changes were made to reflect changes in the external environment that resulted in the university receiving lower than expected revenue. These changes further decreased the level of transparency of the model and the overall link between the model drivers and the final allocation to Faculties.

The formula based model is a single year budget with no provision for under or over spends to be addressed in future years. In addition the model is completed on a year by year basis and does not require forecast of student numbers and fees or the provision of workload (staffing) (Kong 2005) plans to be submitted. The budgeting model requires each Faculty and administrative unit to complete single year budgets only and the central finance team then use these results to project forward the organisation budget for a rolling 5-year period.

The model in general emphasises cost control over all metrics and this is highlighted with only 25% of student revenue flowing directly to the Faculties. Rewards for increasing student numbers and research are provided on a cost recovery basis, and as a consequence, the model is considered limited in incentivising income generation for the University.

Categorisation of Income and Expenses	Typical Profit and Loss Structure	Areas of Accountability
	INCOME	
Direct Income	Student Fee Income	
Indirect Income	Other Income	
	Total Income	1
Intermediate Expenses	Expenses for Central Services	
	IT	
	HR	
	Marketing	
	Finance	
	Total Intermediate Expenses	2
Indirect Expenses	Indirect Expenses	
	Executive Salaries (VC, DVC's, CFO, COO, etc)	
	other Central Costs to run Exec Portfolios	
	Total Indirect Expenses	3
	Total Expenses (Direct, Intermediate and Indirect)	4
Formula Based Distribution	Total Faculty Pool (Income less indirect and intermediate expenses)	5
Formula Based Income (Direct Income)	Income Allocation	
Indirect Income	Other Income	
	Total Faculty Income	6
	EXPENSES	
Direct Expenses	Salaries	
	Other	
	Total Direct Expenses	7
At Faculty Level	Gross Surplus/Deficit	8
At University Level	Net Surplus/Deficit (net profit level)	9

Figure 6 - MQ P&L Structure

University of Sydney

The University of Sydney is located in Sydney Australia, was founded in 1850 and is 165 years old. In 2013 the Equivalent Full Time Teaching Load (EFTSL) was 32,492 and it earned \$1.9b in revenue from continuing operations. Using the Academic Ranking of World Universities 2013 (ARWU) compiled by Shanghai Jiao Tong University, Sydney University ranked 97th internationally and 5th nationally (in Australia).

The budget model used over the period was a profit centre based model and is referred to as the University Economic Model (UEM). All revenue earned, including trailing government payments for research infrastructure support, are distributed to the Faculty and Schools (point 1 in 'areas of accountability', Figure 7 below). Costs for central areas are charged as levies to the Faculties and

Schools using 3 cost drivers. The cost drivers include EFTSL, Full Time Equivalent staff (FTE) and space occupancy (point 4, in Figure 7). Levies are also applied to create strategic investment pools, which are then re-allocated to Faculties and Schools based on a competitive process.

Categorisation of Income and Expenses	Typical Profit and Loss Structure	Areas of Accountability
	INCOME	
Direct Income	Student Fee Income	
Indirect Income	Other Income	
	Total Income	1
	EXPENSES	
Direct Expenses	Salaries	
	Other	
	Total Direct Expenses	2
	Gross Surplus/Deficit (gross profit level)	3
Intermediate Expenses	Expenses for Central Services	
	IT	
	HR	
	Marketing	
	Finance	
	Total Intermediate Expenses	4
	Gross Surplus/Deficit (gross profit level)	5
Indirect Expenses	Indirect Expenses	
	Executive Salaries (VC, DVC's, CFO, COO, etc)	
	other Central Costs to run Exec Portfolios	
	Total Indirect Expenses	6
	Total Expenses (Direct, Intermediate and Indirect)	7
	Net Surplus/Deficit (net profit level)	8

Figure 7 - USYD P&L Structure

Levies are applied at different rates for different purposes and can change from year to year, with the rate of these levies determined and agreed centrally. Other levies are applied at variable rates for capital projects and these are used for maintenance and repairs as well as to accumulate funds for larger scale building projects. The rate at which levies are applied are standard fixed rates and are not based on the level or expected level of service or activity as with cost models that use drivers to budget for expected costs.

The model also imposes differential levels of targets to each Faculty and School for the university to achieve an overall surplus or deficit within the Income statement (point 8). Differential income statement targets by Faculty and School allows high cost areas to operate with proportionally more funding and allows a strategic re-allocation of funding from financially strong areas to other areas. Differential targets enable funding to be directed towards research intensive faculties or allows areas experiencing change (growth or decline) to operate with stability throughout the period of change.

The model allows for multi-year planning and requires other detailed inputs to be forecast to drive the multi-year estimates of income and expenditure. Faculties and schools are required to forecast their expected student load and details of the associated fees, together with the provision of detailed staff work load models and justifications for new positions. The multi-year planning horizon allows carry forwards of over and under spends from year to year and for the Faculty and Schools to be able to absorb movements within their budgets rather than these fluctuations being managed and absorbed centrally.

The model provides a high degree of transparency although a large proportion of costs are fixed through the levy system resulting in a limited ability to alter other Faculty and School related items. The model in general emphasises a planned approach that links student load to fees and then to workforce planning and provides incentives for revenue growth and disincentives for declines.

University of Melbourne

The University of Melbourne (UMelb) is located in Melbourne Australia, was founded in 1853 and is 162 years old. In 2013 the Equivalent Full Time Teaching Load (EFTSL) was 28,708 and it earned \$1.9b in revenue from continuing operations. Using the Academic Ranking of World Universities 2013 (ARWU), Melbourne University ranked 54th internationally and 1st nationally (in Australia).

UMelb used a profit centre based approach over the period referred to as Responsible Divisional Management (RDM). The model allocates all student fee revenue to the Faculties (also called Divisions) that earned the fees although holds trailing research infrastructure support payments made by the government in a central pool (point 1, in Figure 8). These trailing sources are then redistributed based on a competitive process throughout the university.

All intermediate costs are allocated based on a detailed driver based model that uses 33 drivers to apportion costs based on the drivers (point 4). Activity based drivers are used to apportion central overhead charges such as the cost to operate the Human Resource function or the costs associated with the centralised IT function, and other drivers are applied to create pools of funds for strategic purposes. Costs that the divisions have no control over and that have no logically correlated drivers are separated out, and divisions are not held accountable for these costs (point 6). These costs include the costs associated with the vice chancellors office and of the deputy vice chancellors portfolios. Strategic pools, including trailing research infrastructure support payments are then redistributed as income to the Faculties and or central offices.

Each Faculty is provided with an annual operating margin target, represented both as a percentage and as a dollar amount (point 6), to achieve or to better, and the expectation is that the margin will be maintained irrespective of upward or downward movements in student or grant volumes. The university recently changed focus and fine-tuned the model by focusing more on the required dollar

amount of the margin as opposed to the area maintaining the required margin percentage. The effect of this is that over performance allows surplus funds to be retained by the faculty, providing a clear incentive. When margin targets are not met, faculties are expected to reduce expenditure to achieve the required dollar margin. The model is constructed using a detailed model to forecast student load, and this model is a central driver of cost allocations. Through the budgeting process and over the budgeting period generally, the student load model is constantly being refined, and the associated revenue and cost flowing through.

Categorisation of Income and Expenses	Typical Profit and Loss Structure	Areas of Accountability
	INCOME	
Direct Income	Student Fee Income	
Indirect Income	Other Income	
	Total Income	1
	EXPENSES	
Direct Expenses	Salaries	
	Other	
	Total Direct Expenses	2
	Gross Surplus/Deficit (gross profit level)	3
Intermediate Expenses	Expenses for Central Services	
	IT	
	HR	
	Marketing	
	Finance	
	Total Intermediate Expenses	4
	Gross Surplus/Deficit (gross profit level)	5
Indirect Expenses	Indirect Expenses	
	Executive Salaries (VC, DVC's, CFO, COO, etc)	
	other Central Costs to run Exec Portfolios	
	Total Indirect Expenses	6
	Total Expenses (Direct, Intermediate and Indirect)	7
	Net Surplus/Deficit (net profit level)	8

Figure 8 - UMelb P&L Structure

The model includes a charge for space and facilities based on the square meter area used and incentivises areas to use space efficiently (located within point 4 costs). These charges represent a large proportion of overall costs and change based on the type and quality of space being occupied. New and or areas that require significant operating costs attract a larger per square meter charge compared to other areas.

Budgets are developed for a rolling three year period and there are some provisions that allow a carry-over of funds from year to year. The multi-year approach is developed using the student load model as the base planning input and unlike the university of Sydney model, does not require a detailed

workload allocation model to be completed. Carry forwards are in future years on an approval basis and where strict criteria are met.

The University of Melbourne model makes available to budget managers all the relevant drivers of revenue and cost to enable them and the organisation as a whole to be managed in a highly planned manner. Organisational management is decentralised with stringent controls on all aspects of operations to achieve agreed objectives. Access to a large number of drivers provides management an ability to control most aspects of operations although significant time is spent analysing the 33 cost drivers as opposed to a focus on improving revenue or operational effectiveness.

Griffith University

Griffith University (GU) is located in Brisbane Australia, was founded in 1975 and is 40 years old. In 2013 the Equivalent Full Time Teaching Load (EFTSL) was 25,253 and it earned \$820m in revenue from continuing operations. Using the Academic Ranking of World Universities 2013 (ARWU), Griffith ranked 301-400 internationally and 10-16 nationally (in Australia).

GU uses a profit centre based budgeting approach that is premised on incentivising Faculties to generate income, provide rewards for teaching and research performance, allow cost management and provide the university a capacity to support strategic initiatives.

All forms of revenue are allocated directly to the Faculties including student fees and trailing government infrastructure support payments (point 1, in the 'areas of accountability' Figure 9). A cost allocation model is then used to apportion the costs of central services to each Faculty. This model is referred to as the Griffith Cost Allocation Model (GCAM). The model uses 13 drivers to allocate costs including drivers to create pools of funds for strategic re-distribution. In contrast to the USYD and UMelb models, only a total amount of faculty related cost allocations is transparent to faculties, rather than the details by individual line item such as IT, HR, Property Maintenance (point 2, grouped as a total with no details of the line composition).

Within the model, base funding is referred to the funding provided less the costs of running various central services. Contributions to create the Research Performance Fund (RPA) and the Learning and Teaching Performance Allocation (LTPA) are then deducted, followed by a re-application of those amounts. The re-allocation of amounts back to Faculties related to the RPA and the LTPA are on a competitive basis and the overall distribution to Faculties thereafter is referred to as the General Budget Funds of the Academic Group (GBFAG).

Budget management at the University occurs to the level of the GBFAG (point 6, Figure 9) and does not consider direct costs of Faculties below the overall amount (i.e., costs associated with point 7). Faculties are then afforded considerable latitude in managing their budgets, with a large degree of

flexibility, to manage operations. This approach does create a level of uncertainty for central administrators although budget holders are held accountable to achieve their objectives. This then serves as a mechanism for cost containment within the budget.

Implicit under this approach is allocation of central allocations prior to amounts being presented to the Faculties (at point 6). This approach also implies contributions towards university surpluses or deficits occur prior to Faculty allocations. Faculties then focus on achieving a balanced budget with remaining allocations, which entails managing direct costs only (point 7) rather than the difference between income and expenses – thus the focus is on expenses only. Amounts that remain unspent at the end of the year, can carry forward to future years, although a strict list of rules governs the access to these previous year's earnings.

Allocations of budgeted revenue and cost are presented in three separate classifications that include Teaching, Research and Other Costs, are included as additional 'horizontal' column headings within the P&L. All income and costs are categorised as teaching, research or other, and some assumptions are used also, which enables the additional level of horizontal presentation. The separation of these elements informs Faculties of any cross subsidisation between each element and from a University perspective the degree of any cross subsidisation. This method of classification further enhances organisational transparency and assists in the management of the organisation.

Budgeting is completed on an annual basis and for a rolling 3-year period and imbalances (over or underspends) are absorbed within each operating unit with restricted accessibility to prior year gains and an expectation that prior year losses will be recovered and returned to the university.

Categorisation of Income and Expenses	Typical Profit and Loss Structure	Areas of Accountability
	INCOME	
Direct Income	Student Fee Income	
Indirect Income	Other Income	
	Total Income	1
Intermediate Expenses	Expenses for Central Services (grouped with no visibility by category)	
	IT	
	HR	
	Marketing	
	Finance	
	Total Intermediate Expenses	2
	Gross Surplus/Deficit (gross profit level)	3
Indirect Expenses	Indirect Expenses	
	Executive Salaries (VC, DVC's, CFO, COO, etc)	
	other Central Costs to run Exec Portfolios	
	Total Indirect Expenses	4
	Total Expenses (Intermediate and Indirect)	5
	Gross Surplus/Deficit (gross profit level)	6
	EXPENSES	
Direct Expenses	Salaries	
	Other	
	Total Direct Expenses	7
	Net Surplus/Deficit (net profit level)	8

Figure 9 - GU P&L Structure

University of South Australia

The University of South Australia (UniSA) is located in Adelaide Australia, was founded in 1991 and is 24 years old. In 2013 the Equivalent Full Time Teaching Load (EFTSL) was 17,737 and it earned \$605m in revenue from continuing operations. UniSA was not provided an international ranking by Academic Ranking of World Universities 2013 (ARWU), although ranked 16th nationally (according to QS World University Rankings).

UniSA has a model that allows transparency of income by the source to Faculties (point 1, in the 'areas of accountability' Figure 10 below). The MQ formula based model, in contrast, does not show any transparency to faculties regarding external revenue. The model then imposes levies on each element of earnings to capture funds for reallocation for strategic initiatives and to be used to contribute to the overall surplus of the organisation. A levy of 40% is imposed on the three largest components of revenue, and other levies vary between 12%-30%. The levies act in the same way as costs drivers in that they represent a method to scale charges for central services (the total of point 2 costs). No transparency is provided to faculties on the intermediate costs by line item, faculties only see the total of all levies and are provided no information on the costs of, say, their IT services or the costs of the HR services they consume (or details of other intermediate charges). The driver based approach in

methodology implies a stronger relationship between faculty allocated costs and the relevant drivers of service volumes. Whereas a levy achieves a similar result, although takes a simplified approach based on income rather than on volume drivers related to service areas – with the levy more closely aligned to the concept of a tax rather than a fee for service. In total levies are applied to nine components of revenue and although the model provides transparency of income it appears more closely aligned with a formula based allocation approach.

Levies are applied to both components of income including fees and research income. Within research income, levies are also applied to trailing sources of government research infrastructure support payments. After the levies are applied funds are available for faculty related costs and the budget model imposes no restriction on these elements (point 8, representing the difference between the formula based allocation and direct expenses). Levies are then redistributed to support teaching, research, strategic initiatives and to contribute to the Universities pool of surplus funds for future capital or operating needs. Some levies are used directly and not redistributed and primarily relate to the provisioning of central services such as those required to fund the vice chancellors portfolios and other centralised services.

A detailed activity based costing (ABC) model is used to assess the viability of offerings (Dragija and Dražić Lutilsky 2012), although this resides outside the budgeting model and is used to provide a different view of costs compared to the budget (Kong 2005). The activity based view often presents information by bundling all revenue and costs associated with a program, such as those for a Bachelors of Arts or Bachelor of Science degree, allowing transparency of the viability of such programs. Many universities choose to use an ABC model independently of the overall budget as an additional measure of program success and a measure that transcends organisational boundaries related to structure.

This benefit is also viewed as disadvantageous in that the ABC model does in fact largely ignore organisational structure. Having an additional financial model (the ABC model) that operates independently of the organisational budget also reduces the ability to quickly and directly influence organisational outcomes using budget linked financial measures. Budgeting is completed on an annual basis and the model does not allow carry overs of over or underspends.

Categorisation of Income and Expenses	Typical Profit and Loss Structure	Areas of Accountability
	INCOME	
Direct Income	Student Fee Income	
Indirect Income	Other Income	
	Total Income	1
Intermediate Expenses	Expenses for Central Services (charged as levies on teaching and research)	
	IT	
	HR	
	Marketing	
	Finance	
	Total Intermediate Expenses	2
Indirect Expenses	Indirect Expenses	
	Executive Salaries (VC, DVC's, CFO, COO, etc)	
	other Central Costs to run Exec Portfolios	
	Total Indirect Expenses	3
	Total Expenses (Direct, Intermediate and Indirect)	4
Formula Based Distribution	Total Faculty Pool (Income less indirect and intermediate expenses)	5
Formula Based Income (Direct Income)	Income Allocation	
Indirect Income	Other Income	
	Total Faculty Income	6
	EXPENSES	
Direct Expenses	Salaries	
	Other	
	Total Direct Expenses	7
At Faculty Level	Gross Surplus/Deficit	8
At University Level	Net Surplus/Deficit (net profit level)	9

Figure 10 - UniSa P&L Structure

Comparison of models

Reviewing the budgeting models of the universities in the sample has shown that within a particular category of budgeting models such as either a profit centre based approach or a formula based approach that there still remain differences in each model.

The three universities that adopt a profit centre based approach were the USyd, UMelb and GU. The USyd model has a focus on labour utilisation with the inclusion of a workload model into the budgeting model and process. The UMelb model includes a detailed activity based costing model to account for the allocation of costs to profit centres, based on a large number of activity and cost drivers. The USyd model uses 3 drivers to allocate central costs, while UMelb uses 33 drivers and GU uses 13 drivers. GU's model included a categorisation of revenue and costs by teaching, research and 'other'.

The two universities that adopted a formula based approach also had significant differences. The MQ model was based on a complex set of metrics and associated revenue allocations to derive budgetary

allocations. The UniSA uses a formula based on revenue categories with differing allocations per category and with far fewer variables compared to the Macquarie model.

The differences within each model may be a result of various factors including the strategic objectives of the organisation, the culture of the organisation, the political and power dimensions between central areas and student facing areas and the organisational structure. The budget models may have been created to enhance these dimensions or to reduce the effects of these dimensions for the organisations to achieve their mission (Rossmann and Shanahan 2012).

A summary of key features of universities in sample that use a profit based model (Figure 11) and formula based model (Figure 12) are presented below.

USYD	UMelb	Griffith
• Scene set with annual Strategic planning • 2-year model • Integrated load planning and fees • Integrated workload model • Accountability on <i>net</i> operating margin • 3 levels of central charges – Cost recovery (central services and space) – Levies (capital and strategic fund) – Cross subsidy (research realignment, strategic realignment) • Carry-forward not allowed	• Scene set with annual Strategic planning • 3-year model, rolling forecast budget model • Integrated load planning and fees • Accountability on Direct Controllable Margin (gross margin) \$ and % • Carry forwards accumulate in reserves fund. Accessible for strategic initiatives • Driver based allocation model (22 drivers) including space	• 3-year budget model • Integrated load planning and fees • Accountability on Funds for Faculties (similar to MQ FFM allocation to Faculties, except they show <i>all</i> other costs) • Carry forwards allowed for certain non continuing salary items • Driver based allocation model using 14 drivers including space • Revising model to remove visibility of cross charges, resulting in single line allocation to Faculties. P&L will show external revenue, central charges as a total, and allocation to Faculty

Each model has a defining factor

Figure 11 - Summary of Key Features (Profit Based Models)

MQ	Uni SA
• No initial strategic planning element • 3 year model, as 3 distinct years no carry overs • External income recognised at university level only • Less central charges and funds for strategic investment • = Pool available for Faculties • Faculty formula allocation of income (using 10 drivers) • Add income allocated for strategic investment contribution • Less direct cost • = Agreed surplus/ (deficit)	• Univesty wide strategic planning • Single year budget • External income recognised at university levels • Less central levies • = Pool available for Faculty • Faculty allocation of income (based on 3 drivers) • Add income from redevelopment and strategic support funds • Less direct cost • = Net operating result

Figure 12 - Summary of Key Features (Formula Based Models)

Analysis of performance - method and hypothesis

To examine the relationship between the budget model and performance, a detailed analysis is proposed, within the sample selected. Performance measures are chosen based on a mix of teaching, research and financial measures. Of the 14 measures, 5 are financial, 3 teaching specific, 4 research specific and 2 mixed measures. Relationships between variables will be tested using statistical measures of the means to determine any differences between universities. One source of variation that is not available in the data set is where the budget model was changed through the period, with performance measured before and after the change. This data was not available in the period selected, within the sample, as no university changed its model. However many indicated that they will be changing budgeting models through 2015 and 2016. Having this variable would have strengthened the results; irrespective, the analysis shows a number of interesting results.

The hypotheses being investigated is that no mean difference in results will be apparent between the universities that use a profit based model namely USyd, UMelb and GU (Group 1), compared to those that use a formula based approach namely MQ and UniSA, and that the results for MQ and UniSA (Group 2) will be comparable although different to those of the other three universities that used a profit based model. In addition using a case study based approach, it is hypothesised that a mean difference will be observed between USyd and MQ in comparing the budgeting model and the performance for international student number growth and on HDR completion rates.

More specifically the hypotheses being testing include the following:

1. Revenue per EFTSL hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
2. Retention rate hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
3. Attrition rate hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2

4. Success rate hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
5. Debt to equity hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
6. Net assets hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
7. Research income hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
8. Research income per staff member hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
9. Research publications hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2
10. Research publications per staff member hypothesis:
 - a. No mean difference between USyd, UMelb and GU (Group 1)
 - b. No mean difference between MQ and UniSA (Group 2)
 - c. Mean difference between Group 1 and Group 2

11. Research income and EFTSL hypothesis:

- a. Positive correlation between research income and EFTSL

12. Research income and staff numbers hypothesis:

- a. Positive correlation between research income and number of staff

13. Revenue and net assets hypothesis:

- a. No mean difference between USyd, UMelb and GU (Group 1)
- b. No mean difference between MQ and UniSA (Group 2)
- c. Mean difference between Group 1 and Group 2

14. Revenue and budgeting model hypothesis:

- a. Positive correlation between revenue and the type of budgeting model

15. International student number growth and the budgeting model hypothesis examining a detailed case between USyd (profit based budgeting model) and MQ (formula based model):

- a. Mean difference between USyd and MQ

16. HDR completion rates and the budgeting model hypothesis examining a detailed case between USyd (profit based budgeting model) and MQ (formula based model):

- a. Mean difference between USyd and MQ

The results of the hypotheses tests will be examined in the next section which will be described in three parts:

1. An examination of the results for universities that use a profit based budgeting model
2. An examination of the results for the universities that use a formula based budgeting model;
and
3. An examination of a specific case comparing international student growth and HDR completion rates between USyd and MQ

Section 4 Analysis and Results

Profit Based Models – A Comparison between Universities

USyd, UMelb and GU used the same budgeting approach that distributes income to 'profit centres'. This analysis will test whether there is a relationship between the budget model used and the components of university performance for teaching, research and other financial measures or whether other factors account for performance variations.

Figure 13 summarises the results of the analysis, with the results grouped by those universities that use a profit based model compared to those that used a formula based approach. The analysis includes a comparison between universities using the same budgeting model and between the other universities in the sample including those that used a different budgeting approach.

In only 1 category of tests, of the 14 measures examined, was there an identifiable comparable mean across the universities that all used a profit based model compared to those that used a formula based approach. This result was apparent when testing the correlation between the revenue and the budgeting model used, at each university. In 9 of the 14 measures of mean difference there was no mean difference in results between the universities that used a profit based approach, although this only included a similarity between any 2 of the 3 universities. In only one instance was there a similarity across all three universities that used a profit based budgeting model. Of the 9 measures that showed no mean difference (for the profit based budgeting model sample), 7 tests showed a similarity between USyd and UMelb, 1 between UMelb and GU and 1 between all three universities.

Tests	Category of test	Profit Based Models					Formula Based Models	
		Sydney University (USyd)	Melbourne University (UMelb)	Griffith University (GU)	Macaquarie University (MQ)	University of SA (UniSA)		
Revenue per EFTSL relationship	Financial	No mean difference to UMelb	No mean difference to USyD	No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU		
Retention rate (group 1)	Teaching	No mean difference to UMelb	No mean difference to USyD					
Retention rate (group 2)	Teaching			No mean difference to MQ	No mean difference to GU			
Attrition rate	Teaching	No mean difference to UMelb	No mean difference to USyD					
Success rate	Teaching			No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU		
Debt to equity (group 1)	Financial				Difference to all others			
Debt to equity (group 2)			No mean difference to GU	No mean difference to UMelb				
Net assets (group 1)	Financial	No mean difference to UMelb	No mean difference to USyD					
Net assets (group 2)				No mean difference to MQ	No mean difference to GU			
Research income (group 1)	Research	No mean difference to UMelb	No mean difference to USyD					
Research income (group 2)				No mean difference to UniSA		No mean difference to GU		
Research income (group 3)					No mean difference to UniSA	No mean difference to MQ		
Research income per staff	Research	No mean difference to UMelb	No mean difference to USyD	No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU		
Research publications	Research	No mean difference to UMelb	No mean difference to USyD					
Research publications per staff (group 1)	Research	No mean difference to MQ, UMelb, UniSA	No mean difference to MQ, USyD, UniSA		No mean difference to UMelb, USyD, UniSA	No mean difference to UMelb, USyD, MQ		
Research publications per staff (group 2)				Different				
Research income and EFTSL (independent correlations)	Research and Teaching	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation		
Research income and staff numbers (independent correlations)	Research and Teaching	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation		
Revenue and net assets (independent correlations)	Financial	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation		
Revenue and budget model (group 1)	Financial				Significant correlation to UniSA	Significant correlation to MQ		
Revenue and budget model (group 2)		Significant correlation to UMelb, GU	Significant correlation to USyD, GU	Significant correlation to USyD, UMelb				

Figure 13 - Analysis of Results (Profit Based Models)

Key: Green squared highlight 'no mean difference' in results using the same budgeting model. Orange squared highlight 'no mean difference' for results but where different budget models are used.

The analysis to follow provides focused commentary on USyD, UMelb and GU as they use a profit based model. The section thereafter focuses on MQ and UniSA that both use a formula based budgeting model approach.

The Revenue per EFTSL relationship was tested to analyse whether there was a real difference between the Universities in the sample with respect to the relationship between revenue and the number of students. Analysing the data within the sample it was found that two distinct groups exist (Figure 14). Group 1; includes USyD and UMelb and there is no mean difference in the revenue per EFSTL between these universities, however there is a mean difference to the other universities in the sample (i.e. group 2). GU has a mean revenue per EFTSL that differs from USyD and UMelb even though they maintain the same type of profit based funding model.

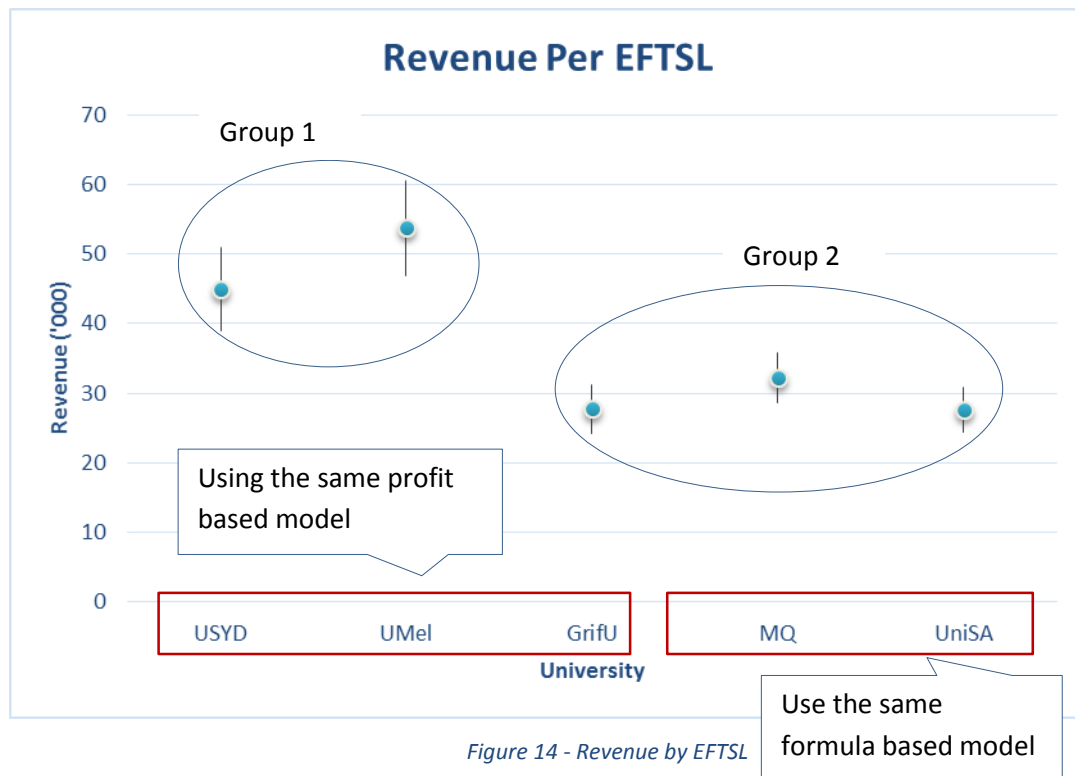


Figure 14 - Revenue by EFTSL

EFTSL provides a measure of student load factoring a proportional allocation for students studying part time and those students taking fewer or more units compared to the standard load. Standard load is usually defined as the number of credit points associated with a unit of study multiplied the normal number of units required in that year to complete the degree program in a stated time period. Funding is provided, for domestic undergraduate units, from the Australian government per EFTSL with the amount proportional to the band and cluster. Medical and science based units receive greater funding than business and arts type units as science units require greater amounts of face to face teaching time that includes laboratory classes and the use of expensive scientific equipment and consumables. A higher revenue per EFTSL sum per University may be reflective of the fact that they teach a greater proportion of scientific and or medical related courses compared to other universities or that students are accelerating their progression by taking on greater loads than the standard load. Older and more established universities are also more likely to run large cohorts of instruction in areas such as medicine and other science areas, whereas newer universities tend to not have such programs or have programs that are much smaller in scale.

The chart below (Figure 15) clearly shows the size differentials between the University of Sydney (key; red bar in the chart) and the UMelb (green bar), that have similar revenue, and that these two institutions earn at least double that of the other universities in the sample. From 2004 to 2007 the average growth within the sample was 10% and from 2008 to 2013 the average growth fell to 6%.

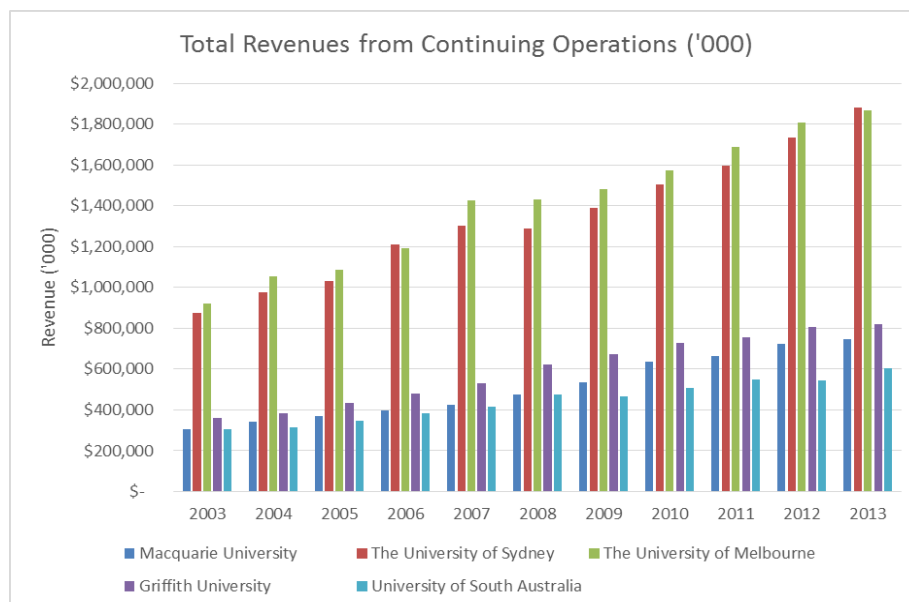


Figure 15 - Total Revenue from Continuing Operations

On a per EFTSL basis UMelb stands out compared to USyd reflecting the higher value per EFTSL they derive from teaching a far greater proportion of high revenue/value courses (such as medicine, veterinary science, and sciences generally) compared to USyd. This is also clearly noticeable when reviewing the EFTSL between the organisation and that USyd teaches around 4,000 EFTSL more than UMelb, while the revenue between the two institutions is similar.

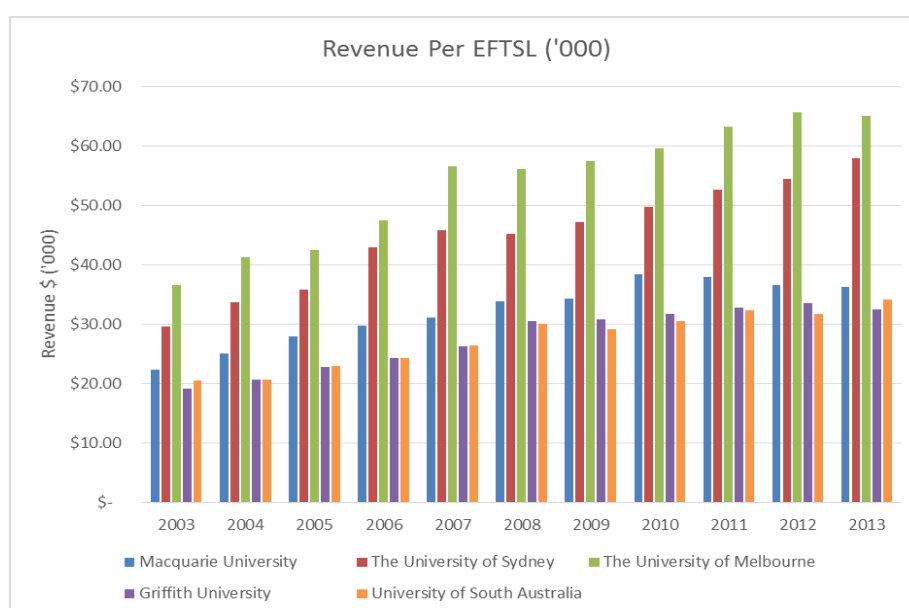


Figure 16 - Revenue per EFTSL

On an EFSTL only basis (Figure 17), USyd teaches a far greater number of students compared to UMelb, highlighted with the red bar exceeding the green bar considerably. Although on a revenue per EFTSL basis (Figure 16) the relationship changes with UMelb earning more compared to USyd due to the fact that it teaches more expensive courses or that it teaches these course in a higher proportion to all other courses taught at the university.

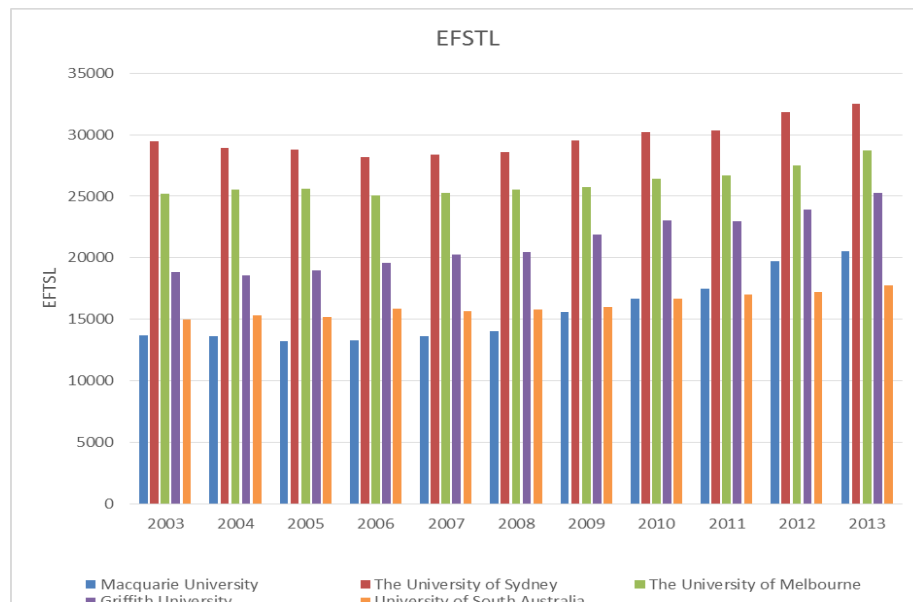


Figure 17 - EFTSL by University

The Retention rate for each university was analysed. Retention rate is a measure of the number of students who commenced a course in year(x) and continue in year(x+1) as a proportion of students who commenced a course in year(x) and did not complete the course in year(x) (<https://education.gov.au>). The analysis showed that there is no mean difference between USyd and UMelb (group 1), although there is a mean difference to GU. This also shows the grouping of USyd and UMelb, as per the previous test, with varying degrees of difference between the other institutions. A priori it was anticipated that the results for GU would be comparable to USyd and UMelb, however results do not support this.

There are numerous factors that impact university retention rates including student's prior academic abilities which is often measured, for undergraduate students, using HSC results (Higher School Certificate), field of study, gender and study patterns (Birch and Miller 2007). Entry scores at larger universities such as USyd and UMelb are generally higher compared to comparable courses, at other universities. The higher entry scores reflect a higher academic standard at the point of entry to university and this is shown to impact the university retention rate. Research has also shown that students completing tertiary studies outside New South Wales, are up to 6% less likely to complete their studies and that this also varies slightly depending on the field of education (Birch and Miller 2007). Retention rates at UMelb were consistently above 90% and in the high 80% for USyd (Figure 18), with GU displaying the poorest retention rates.

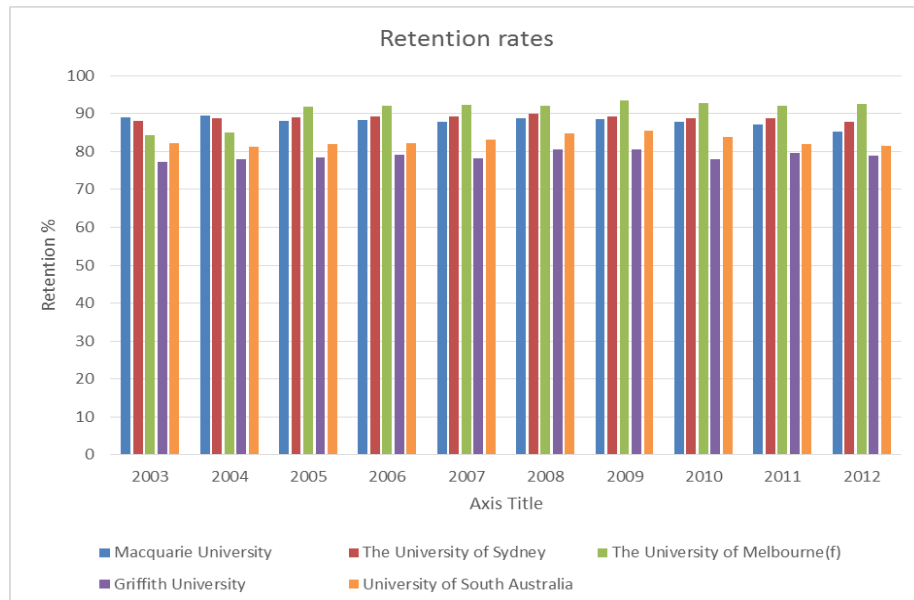


Figure 18 - Retention Rate

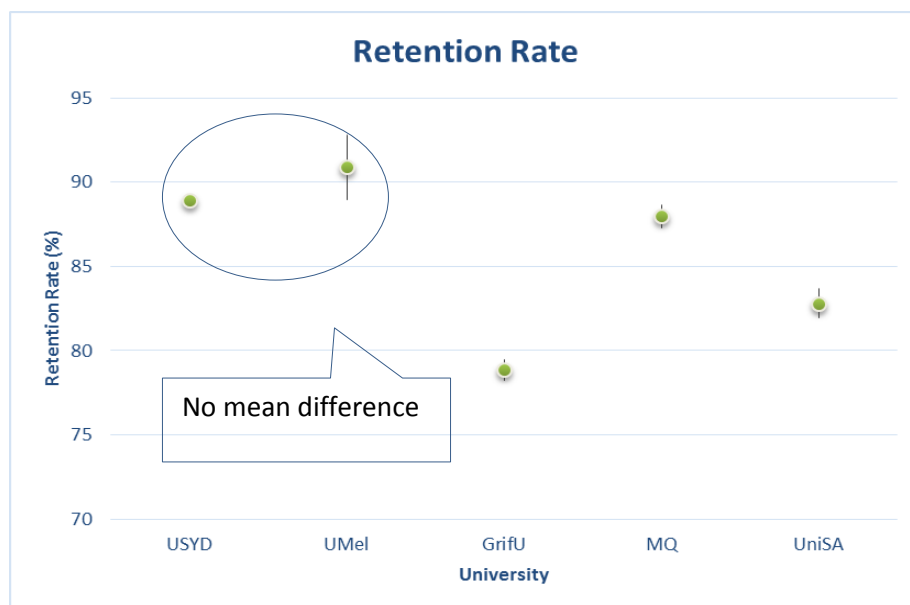


Figure 19 - Retention Rate and Means Differences

The results show that other factors are impacting retention rates compared to the budgeting model alone as Griffith scored the lowest rate despite using a similar type of budgeting model to UMelb and USyd (Figure 19). No similarity was observed for any other universities in the sample with their results scattered below that of UMelb and USyd.

The Attrition rate is a measure of the proportion of students who commenced a course in year(x) who neither complete nor return in year(x + 1). The measure represents an inverse score out of 100% compared to the retention rate with an added component factoring in students that don't complete the unit they are were enrolled in prior to leaving.

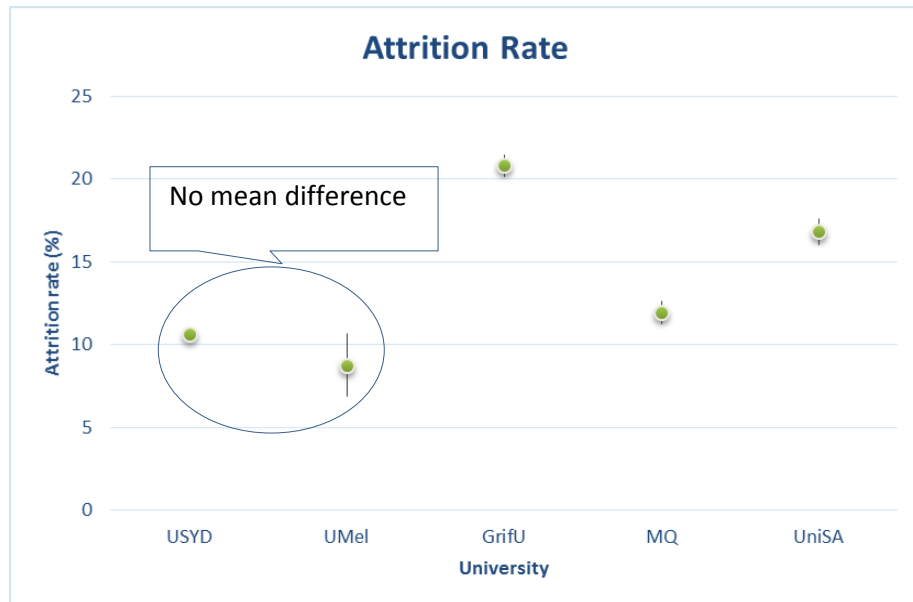


Figure 20 - Attrition Rate and Mean Differences

An analysis of attrition rates across the sample once again displayed a clear grouping of USyd and UMelb, with no mean difference between students (Figure 20). GU attrition rates differed from USyd and UMelb. UMelb had the lowest attrition rate followed by USyd, while the GU result was considerably higher by more than 100%.

In Australia in 1967 it was found that 42% of students that enrolled failed to complete their studies and by 1997 the rate had marginally improved to 39% (Birch and Miller 2005). Within the sample, covering the period 2003-2012, consistent results were observed with Birch and Miller, in that attrition rates remained relatively unchanged (Figure 20 and Figure 21). As with retention and success rates there are a multitude of factors that impact attrition rates and prior academic abilities is acknowledged as one of the most prominent factors.

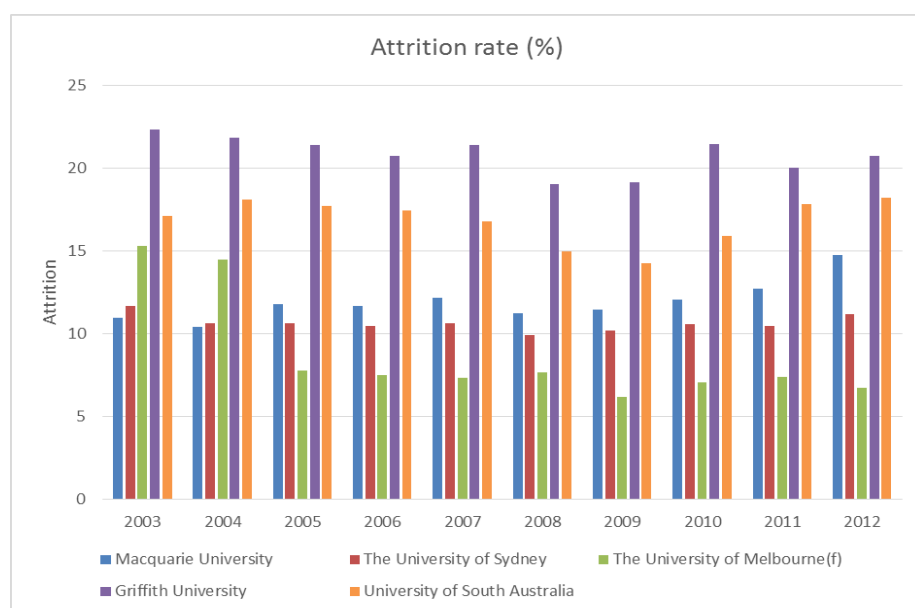


Figure 21 - Attrition Rate

Success rate measures the proportion of actual student load (EFTSL) for units of study that are passed divided by all units of study attempted (passed + failed + withdrawn). In contrast to the results for retention and attrition, there is a mean difference between the success rate of USyd and UMelb, despite the fact that they both use a profit based approach (Figure 22). Griffith also used a profit based budgeting approach although displayed a significantly lower success rate. UMelb had the highest success rate at 92% and USyd at 90%, while Griffith had an average success rate of 85%.

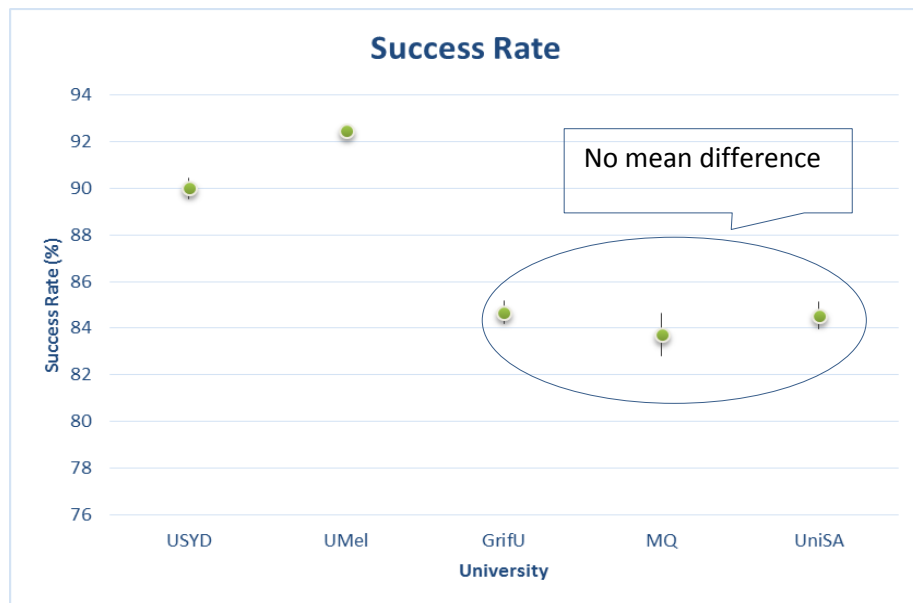


Figure 22 - Success Rate

Noticibly within the time series (Figure 23) the volatility of success rates was higher compared to the variance within the attrition and retention scores. UMelb and UniSA maintained the most stable result while USyd experienced a significant decline. In comparison, MQ's and GU's results also displayed relatively large variances over the period.

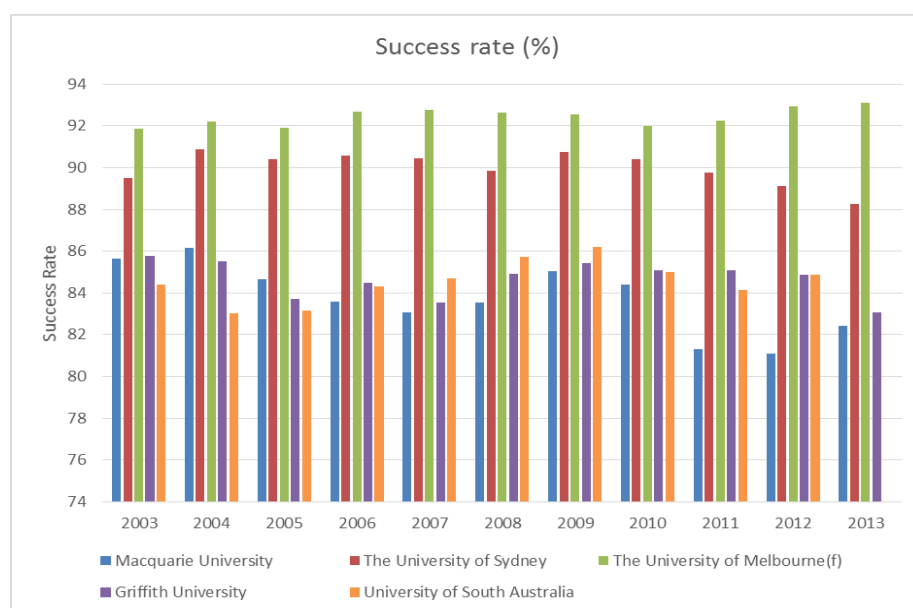


Figure 23 - Success Rate %

The debt to equity percentage, often referred to as risk, gearing or leverage ratio, measures the relationship between the capital contributed by creditors compared to the proportion funded internally, to run the organisation. The ratio also provides a measure of the risk the organisation is willing to accept in undertaking operations in that a higher ratio indicates a larger commitment to pay borrowing costs (interest) and a commitment to make repayments of capital in the future, to avoid loan defaults and other adverse consequences. Traditionally universities have only had small debt to equity ratios indicating that most funding is sourced internally. UMelb and Griffith have no mean difference (group 2) while USyd displays a different mean debt to equity ratio (Figure 24). UMelb has a debt to equity ratio of 5%, Griffith maintained a 6% ratio, and USyd the lowest at 1%.

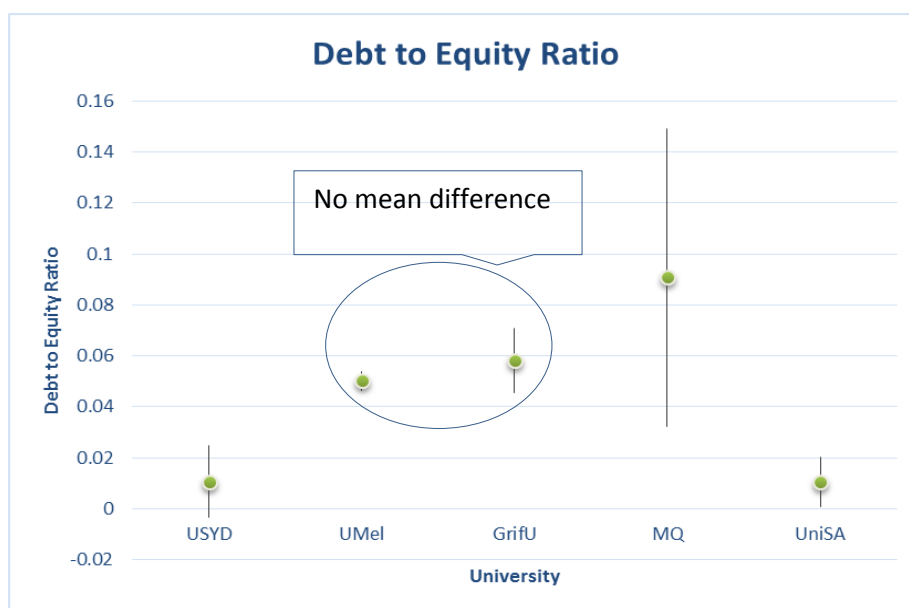


Figure 24 - Debt to Equity Ratio

The time series data below (Figure 25) indicates that USyd only begins to appear on the scale from 2012, prior to that debt represented less than 1%. From 2005 to 2008 GU's rate increased considerably and thereafter moved back to pre-2005 levels, indicating a financing transaction spanning three years. Over the period the debt to equity percentage at UMelb was relatively stable and remained at around 5% with only small fluctuations.

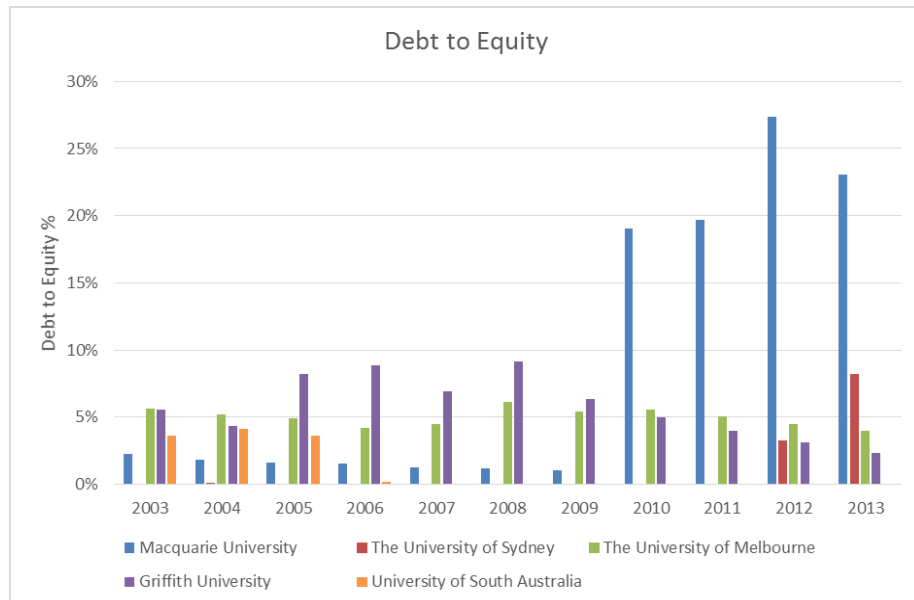


Figure 25 - Debt to Equity Time Series

The net assets of an entity describes the value of all assets less the value of liabilities and provides a measure of the strength of the balance sheet. USyd and UMelb have the highest net assets with no mean difference between them (group 1). Griffith (part of group 2) has statistically lower net assets compared to USyd and UMelb (Figure 26). The mean net asset value for group 1 is \$3billion and for group 2 is \$1.25billion.

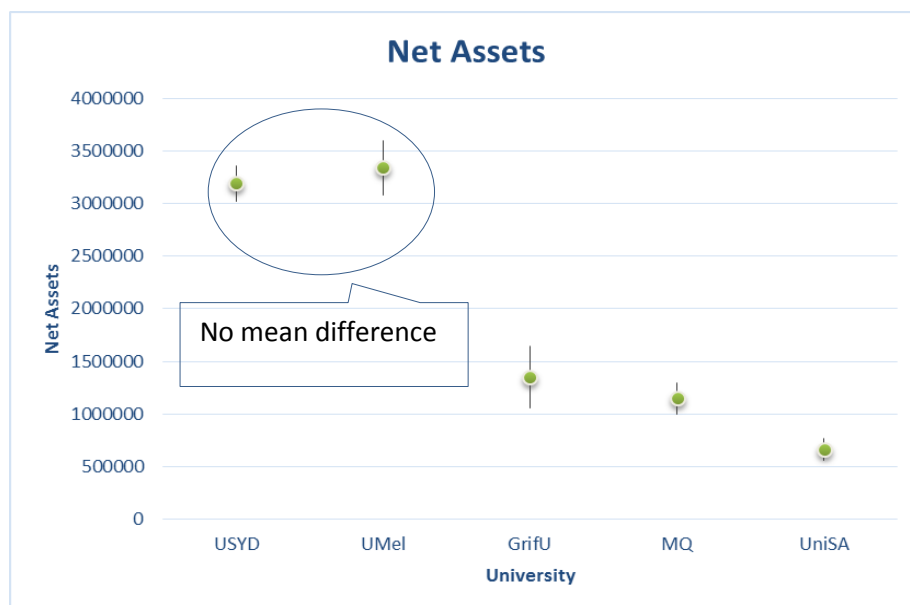


Figure 26 - Net Assets

Over the period net assets in the sector and within the sample group increased (Figure 27). This result was hypothesised given the relatively low levels of debt within the sector and within the sample group. UMelb and USyd, the two oldest universities in the sample, generally maintained more than double the value of assets compared to the other universities. Of note was the steady increase in net assets

held by GU, which in 2013 proportionally increased its position above the other universities in the sample.

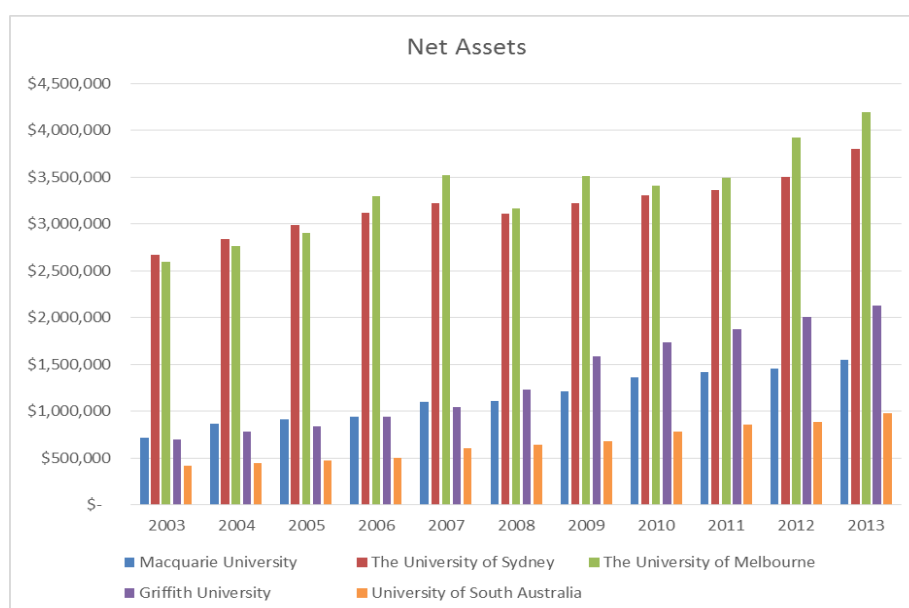


Figure 27 - Net Assets Time Series

Aside from student fees, university income is derived from research work, through a competitive process of bidding for external government and non-government grants and from donations. Research pursuits are imperative in maintaining and enhancing a universities reputation. This in turn serves to increase the universities rankings and brand value and increases general demand to study at the institution. Even though this is an outcome of the research, it is not necessarily the intended direct objective from completing the research, the main objective being the pursuit of scholarship and discovery. Research income from competitive government and non-government grants represents the largest portion of non-fee income. The funds are tied to specific outputs and are used to complete research, which in turn improves the reputation of a university. There is no mean difference between the research income at USyd and UMelb (group 1, Figure 28). Griffith has a lower level of research income compared to USyd and UMelb. UMelb earned \$317m mean research income, while USyd earned \$284m and Griffith earned mean research income of \$51m.

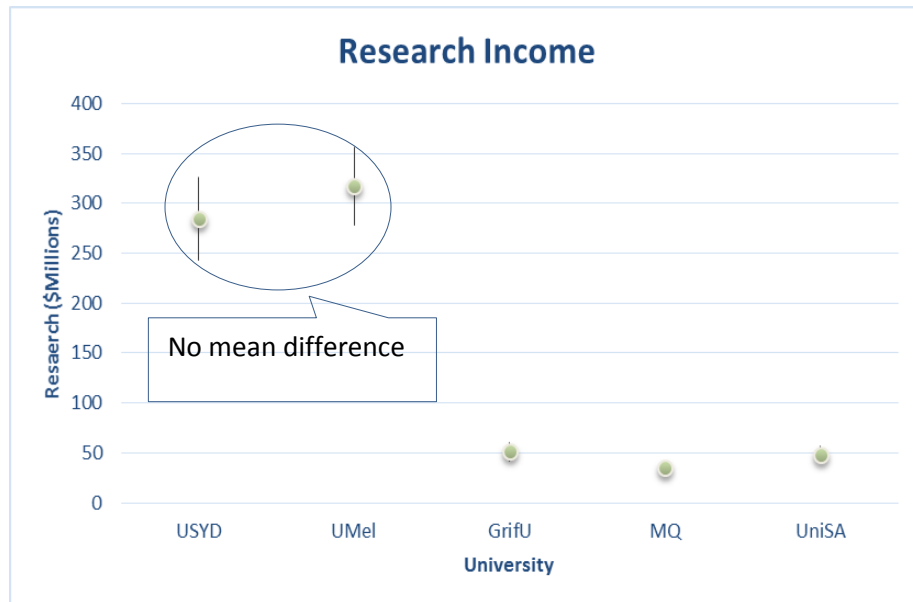


Figure 28 - Research Income

Research income at USyd and UMelb were higher compared to the other universities in the sample by around 600% and between the two universities, their research income increased and decreased in unison. The consistent increase and decreases may be representative of sectoral research funding trends (Figure 29). GU's research income also increased consistently over the period with UniSA, while MQ's research income remaining relatively unchanged.

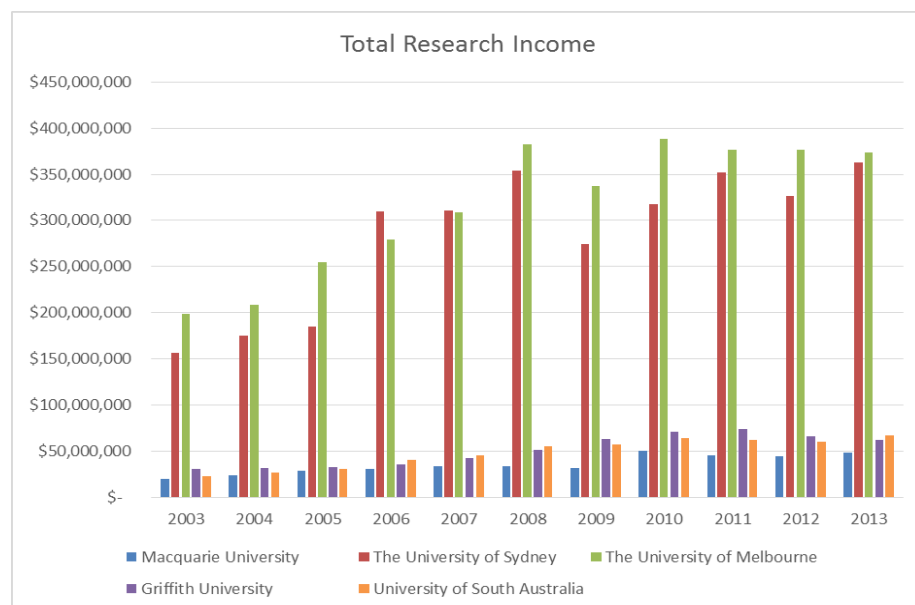


Figure 29 - Research Income Time Series

On a per staff basis an analysis of research income showed that USyd and UMelb had a statistically higher mean compared to the other universities and the mean difference between them is not significant (Figure 30). Griffith had mean research income that was statistically lower than that of the USyd and UMelb grouping.

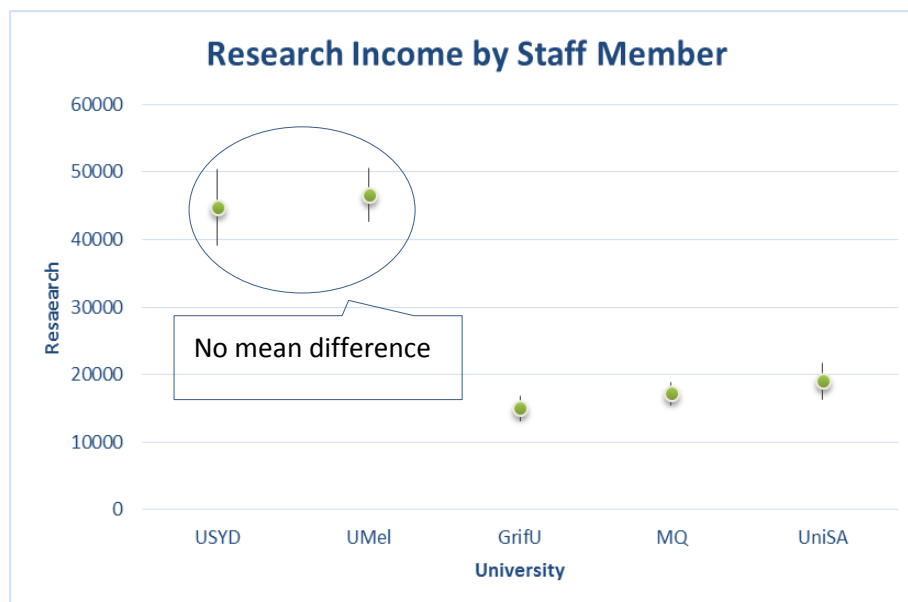


Figure 30 - Research Income by Staff Member

UMelb earned \$47k per staff member, USyd earned \$45k and Griffith earned \$15k per staff member. On a per staff member basis GU's research income was also lower than that of UniSA while they both had similar levels of total research income, highlighting the different levels of staff productivity or the differing job types between the organisations. In addition, the research income per staff member at MQ was greater than that of GU despite MQ having a lower total amount of research income, once again highlighting a key difference apparent with the GU academic workforce (Figure 31).

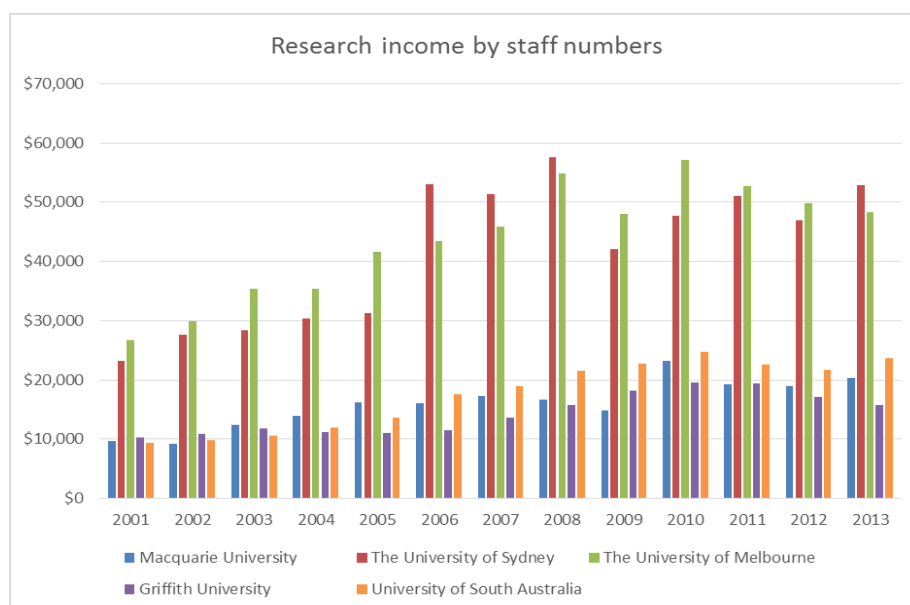


Figure 31 - Research Income by Staff Member Time Series

Analysing the number of research publications produced at each institution it was found that USyd and UMelb had a statistically higher mean compared to the other universities, and the mean difference between them was not significant (Figure 32). Griffith once again had a mean that was statistically different to that of USyd and UMelb.

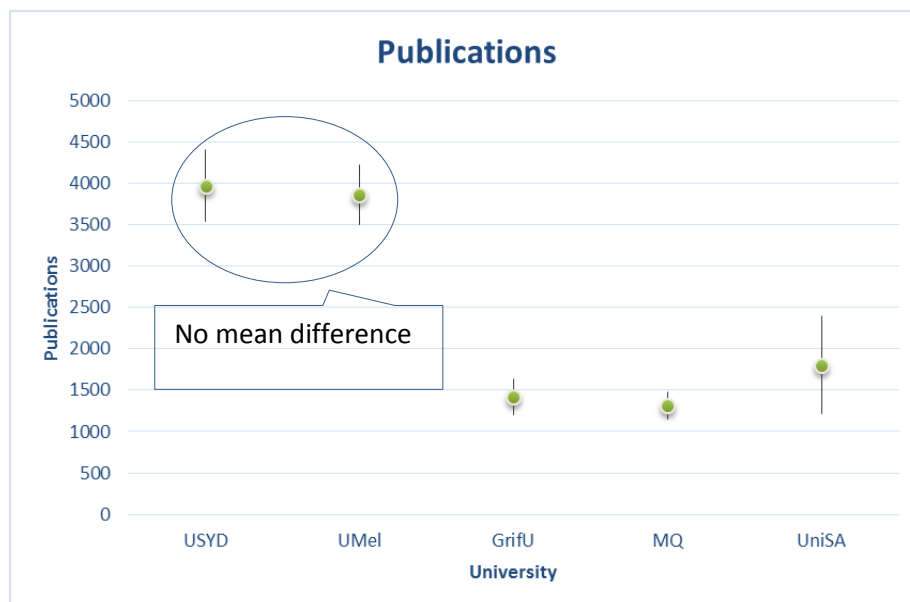


Figure 32 - Publications

The trend in publications outputs between the universities in the sample were almost identical to that of the research income analysis which is generally consistent with expectations given the major output of grant funded research is publications (Figure 33).

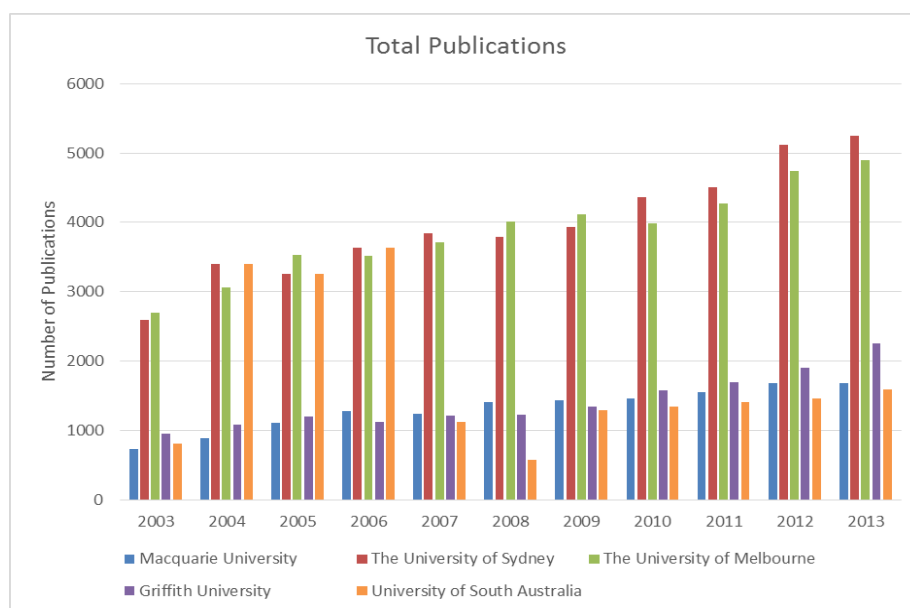


Figure 33 - Publications Time Series

The research publications data was further analysed by exploring the relationships when the data was examined on an output per staff member perspective. This analysis shows that UniSA, MQ, USyd and UMelb (group 1) have comparable means which are higher than the mean displayed at Griffith, despite different budgeting models being used at USyd and UMelb compared to MQ and UniSA (Figure 34). Griffith showed a far lower mean while using a budgeting model comparable to both USyd and UMelb.

By staff member USyd produced 0.6 publications marginally higher than UMelb at 0.57 and Griffith produced the lowest, of all universities in the sample, at 0.4.

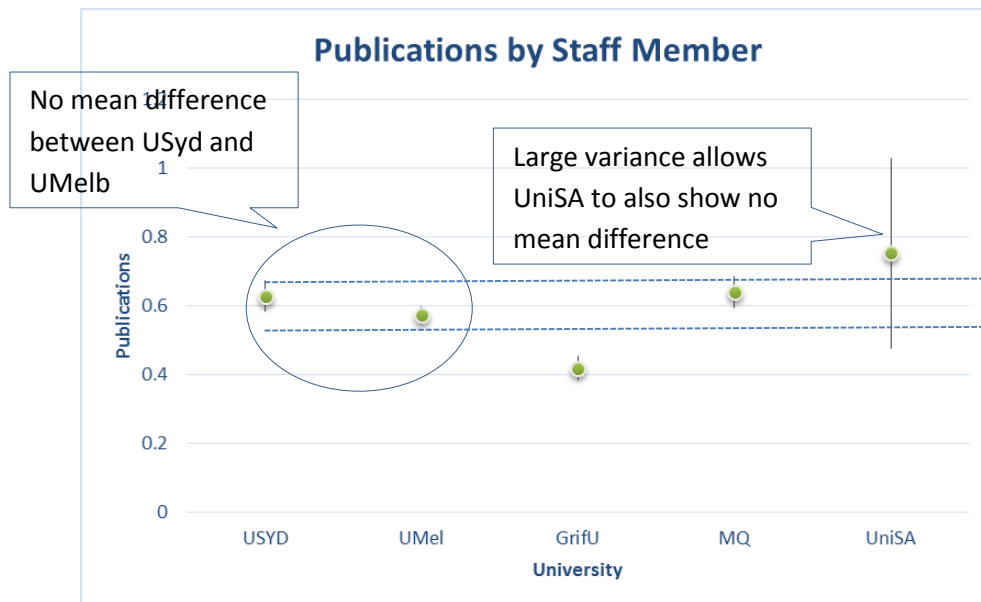


Figure 34 - Publications by Staff Member 2

The time series data shows a number of trends (Figure 35 and Figure 36) including the following:

- Publication by staff member at MQ is among the highest in contrast to its results with respect to research income where it displayed the lowest value across the sample. Publication volumes are as high as USyd and in many years higher, also exceeding volumes at UMelb
- There are three significant outlying points at UniSA where publications volumes are significantly higher compared to all other universities however in the years prior and after volumes once again normalise. This result warrants further investigating given the significant increases in volumes even in comparison to USyd and UMelb.
- The distribution at UniSA outside the three outlying years in 2004, 2005, and 2006 is far less variable by staff member compared to total publications once again indicating a result that warrants further research
- Note the analysis considers only the volume of publications rather than any other measure of quality such as the impact factor or citations, which are also important measures.

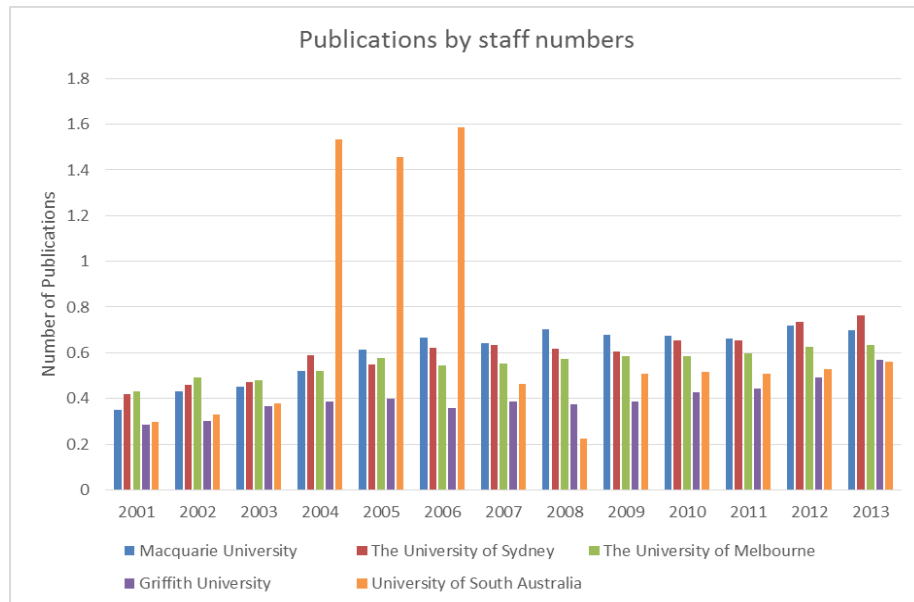


Figure 35 - Publications by Staff Member Time Series

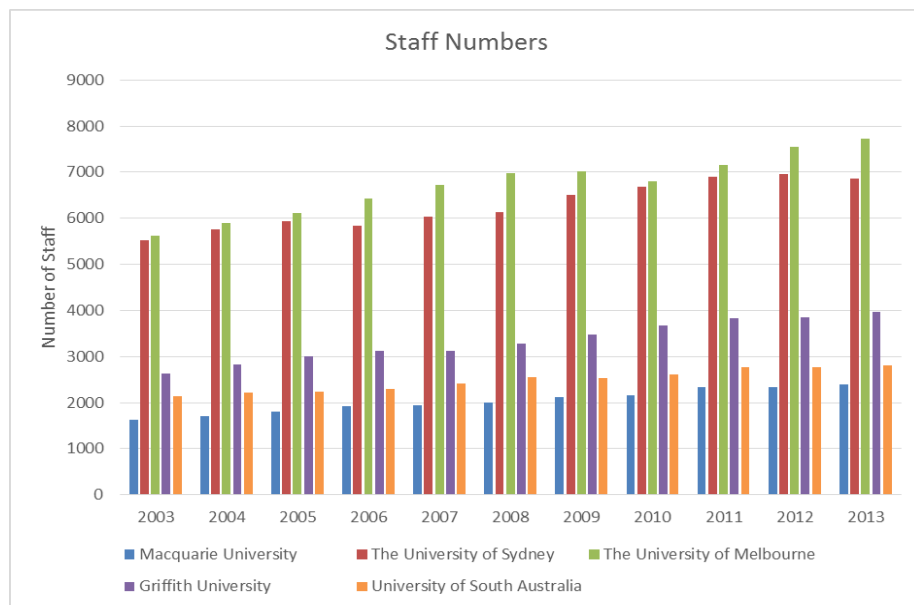


Figure 36 - Staff Numbers Time Series

The last set of analysis completed was a range of correlations between various factors already analysed. The previous range of tests were conducted to compare the results between various universities in the sample. The analysis conducted now focuses on the relationship of the factors, rather than a comparison of the factors by institution. The results show a broader perspective of the relationship between factors as they ignore the institutions and focus on more intrinsic relationships.

In all cases there was a significant relationship observed between the following factors:

- EFTSL and research income
- Research income and staff numbers
- Revenue and net assets
- Revenue and type of budgeting model

Formula Based Models – A Comparison between Universities that Use a Formula Based Approach

MQ and UniSA both use a formula based methodology, although the results of various tests for mean differences shows no clear relationship between the measures of university performance. Figure 37 below summarises the results of the analysis.

In 2 of the 14 measures of mean difference there was no mean difference in results between MQ and UniSA. In 7 of the 14 measures there was no difference found between the universities even though a different budgeting model was used, and in the remaining 5 tests there was nothing significant to report. In relation to these 7 observations, noteworthy is the fact 6 included Griffith as opposed to either USyd or UMelb.

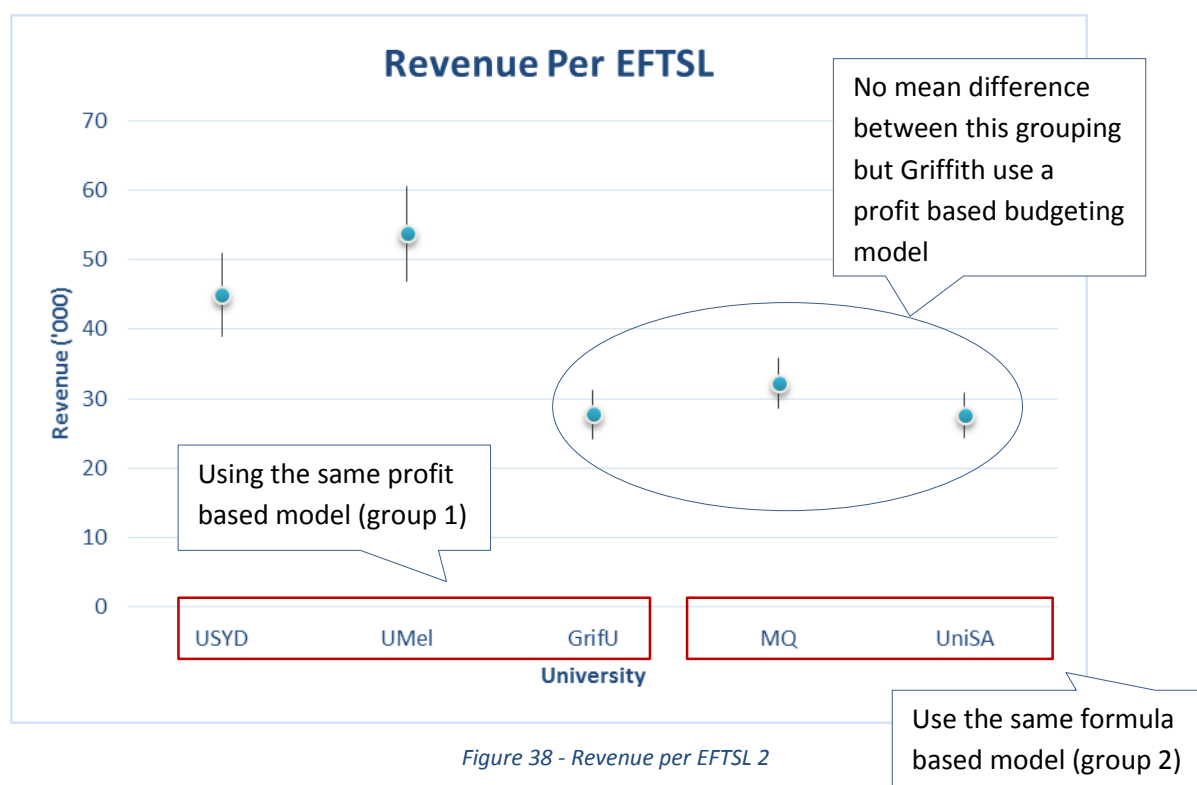
The large amount of ‘orange’ colouring in the table below highlights where there was a statistically significant relationship between university performance between universities in the group that used a profit centre based approach and those that used a formula based approach.

Tests	Category of test	Formula Based Models				
		Sydney University (USyd)	Melbourne University (UMelb)	Griffith University (GU)	Macaquarie University (MQ)	University of SA (UniSA)
Revenue per EFTSL relationship	Financial	No mean difference to UMelb	No mean difference to USyd	No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU
Retention rate (group 1)	Teaching	No mean difference to UMelb	No mean difference to USyd			
Retention rate (group 2)	Teaching			No mean difference to MQ	No mean difference to GU	
Attrition rate	Teaching	No mean difference to UMelb	No mean difference to USyd			
Success rate	Teaching			No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU
Debt to equity (group 1)	Financial				Difference to all others	
Debt to equity (group 2)			No mean difference to GU	No mean difference to UMelb		
Net assets (group 1)	Financial	No mean difference to UMelb	No mean difference to USyd			
Net assets (group 2)				No mean difference to MQ	No mean difference to GU	
Research income (group 1)	Research	No mean difference to UMelb	No mean difference to USyd			
Research income (group 2)				No mean difference to UniSA		No mean difference to GU
Research income (group 3)					No mean difference to UniSA	No mean difference to MQ
Research income per staff	Research	No mean difference to UMelb	No mean difference to USyd	No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU
Research publications	Research	No mean difference to UMelb	No mean difference to USyd	No mean difference to MQ, UniSA	No mean difference to GU, UniSA	No mean difference to MQ, GU
Research publications per staff (group 1)	Research	No mean difference to MQ, UMelb, UniSA	No mean difference to MQ, USyd, UniSA		No mean difference to UMelb, USyd, UniSA	No mean difference to UMelb, USyd, MQ
Research publications per staff (group 2)				Different		
Research income and EFTSL (independent correlations)	Research and Teaching	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation
Research income and staff numbers (independent correlations)	Research and Teaching	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation
Revenue and net assets (independent correlations)	Financial	Significant correlation	Significant correlation	Significant correlation	Significant correlation	Significant correlation
Revenue and budget model (group 1)	Financial				Significant correlation to UniSA	Significant correlation to MQ
Revenue and budget model (group 2)		Significant correlation to UMelb, GU	Significant correlation to USyd, GU	Significant correlation to USyd, UMelb		

Figure 37 - Formula Based Models Overall Correlation Table

Key: Green squares highlight ‘no mean difference’ in results using the same budgeting model. Orange squares highlight ‘no mean difference’ for results, but where different budgeting models are used.

On a revenue per EFTSL basis, there is no difference in means between MQ and UniSA (Figure 38) of which both use the same formula based budgeting approach. Irrespective of Griffith using a profit centre based approach, it displayed a mean that was statistically not different to that of the results from MQ and UniSA. Two distinct groupings are visible in the data; the grouping between USyd and UMelb, and the grouping of the other three universities.



The Retention rate for each university is analysed (Figure 39). There is a mean difference between MQ and UniSA, although no mean difference between MQ and USyd, even though they use different budgeting models. The lowest mean retention rate can be observed at GU. UniSA has a better mean retention rate compared to Griffith, while UMelb had the highest mean retention rate, followed by USyd and MQ. Griffith maintains a campus on the Gold Coast which is outside a capital city and this has been shown to negatively impact the overall results of retention rates (Birch and Miller 2007), while the other universities in the sample maintain primarily capital city based campuses.

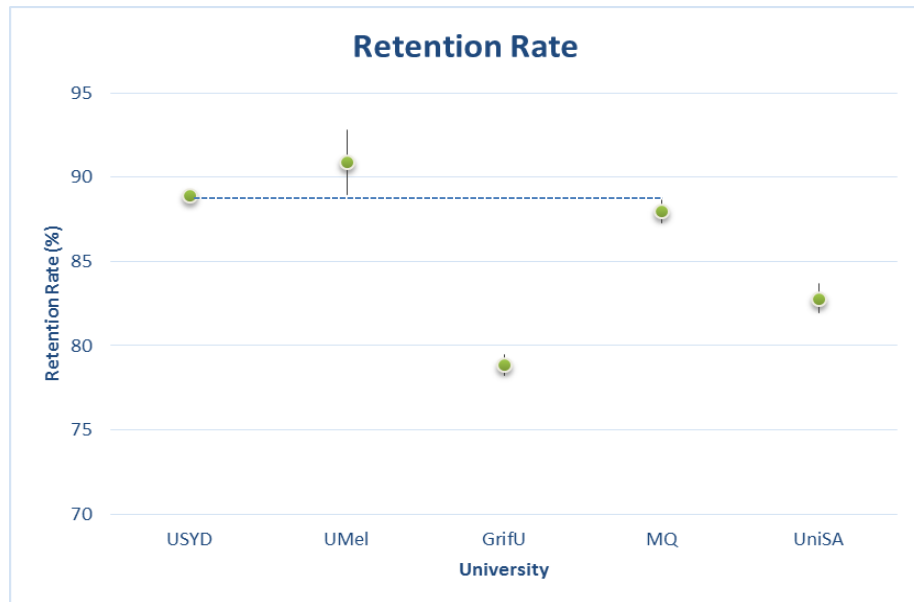


Figure 39 - Retention Rate 2

Reviewing the analysis of attrition rates shows that the mean rate between MQ and UniSA differs by 41% (Figure 40). The mean attrition rate at MQ was 11.9%, while the mean at UniSA was 16.8%. Excluding USyd and UMelb, which displayed similar means, between GU, MQ and UniSA a mean difference of between 24-75% was observed. The dispersion of results show no similarity other than between USyd and UMelb.

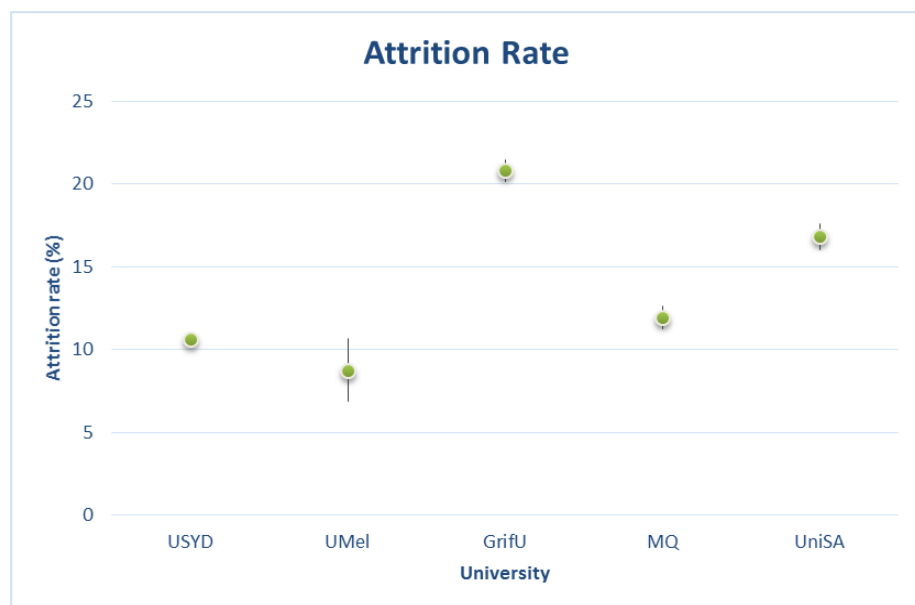


Figure 40 - Attrition Rate 2

The Success rate between MQ and UniSA showed no mean difference. Expanding the sample to also include Griffith shows that it too has a mean success rate comparable to that of MQ and UniSA irrespective of it using a profit based model (Figure 41).

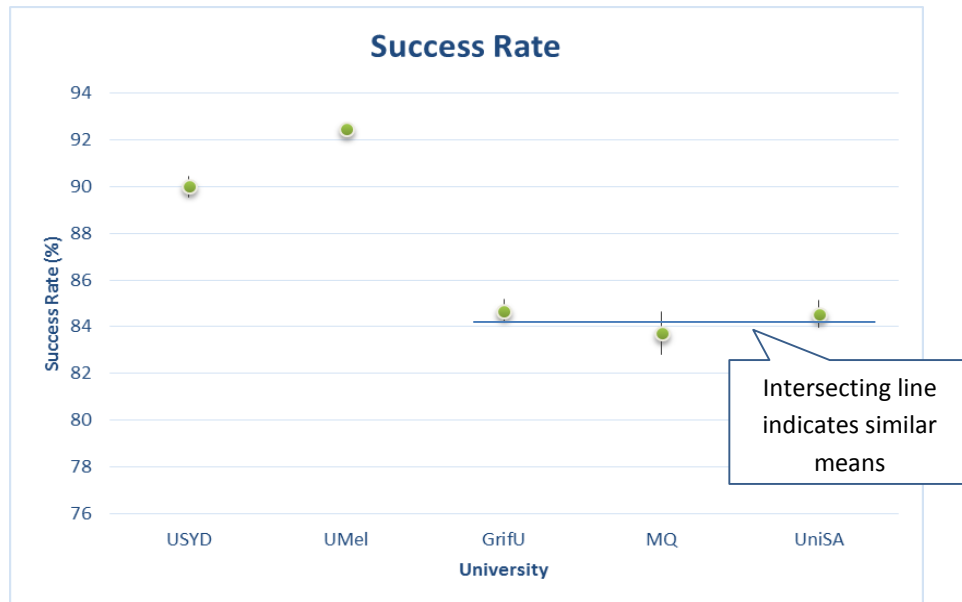


Figure 41 - Success Rate 2

There is no similarity in the debt to equity percentage between MQ and UniSA (Figure 42). The results from MQ provide significant variation with a large debt recognised from 2010 to 2013. This variability also results in a wide confidence interval which shows comparable results to GU and UMelb. The debt to equity ratio for MQ from 2003 to 2009 was around 1%, then increased to 19%, 20%, 27% and 23% between 2010 and 2013 respectively. While MQ had the highest debt to equity ratio, its operating margin was positive and it maintained an interest cover ratio of 6.6, which is considered well above benchmarks (Auditor-General 2014). This analysis provides mixed results with respect to the budgeting model and the debt to equity ratio. There was no mean difference in the ratio between USyd and UniSA despite the different budgeting model used, and there was also no difference between MQ, Griffith and UMelb, of which Griff and UMelb use the same budgeting model, while MQ used a different approach.

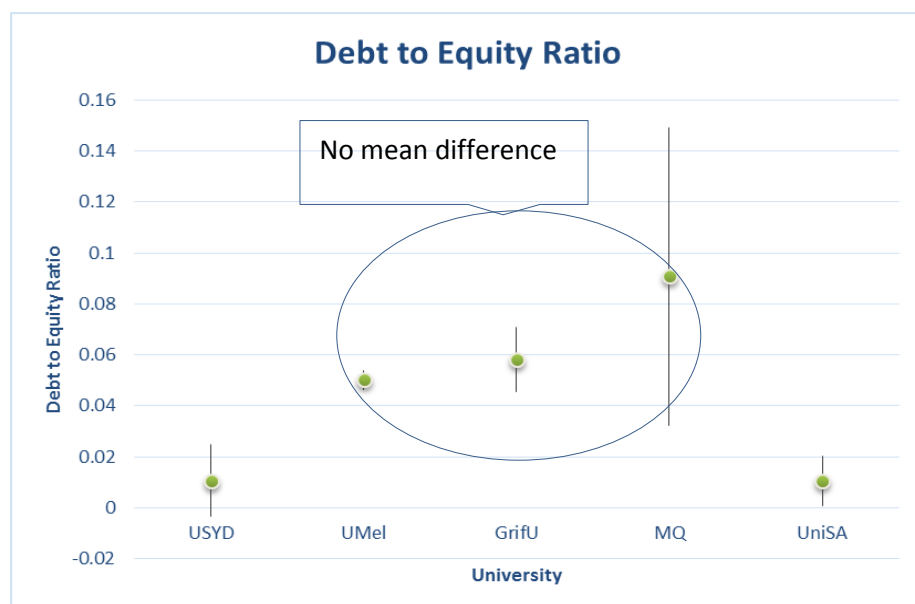


Figure 42 - Debt to Equity Ratio 2

The mean net assets of the two Universities that use a formula based budgeting approach differ considerably (Figure 43). MQ has an average net asset value of \$1.15billion, while UniSA has an average of \$660m. MQ and Griffith (group 2), however, show no difference despite using different budgeting models.

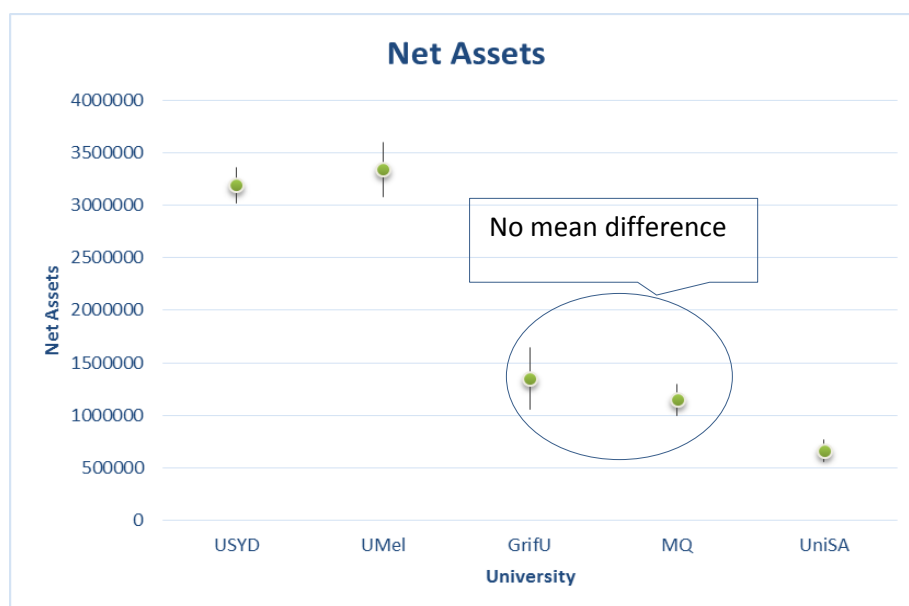


Figure 43 - Net Assets 2

There is no mean difference between the research income at MQ and UniSA (Figure 44). UniSA has average research income of \$48m, while MQ's average was \$35m and the lowest among the universities in the sample. Griffith and UniSA show no difference, although Griffith's mean differs to that of MQ. Griffith's mean is \$51.5m which is \$15.6m higher than MQ's average. On a per staff basis, MQ and UniSA display similar results with their means showing no difference, although Griffith's result is comparable and shows no difference. When examining research income alone, Griffith shows a different mean result compared to MQ. This can be explained by reviewing the number of staff between MQ and Griffith; Griffith has a considerably larger number of staff. On a per staff basis, MQ's mean research income is \$17k, with UniSA at \$19k and Griffith, the lowest, at \$15k.

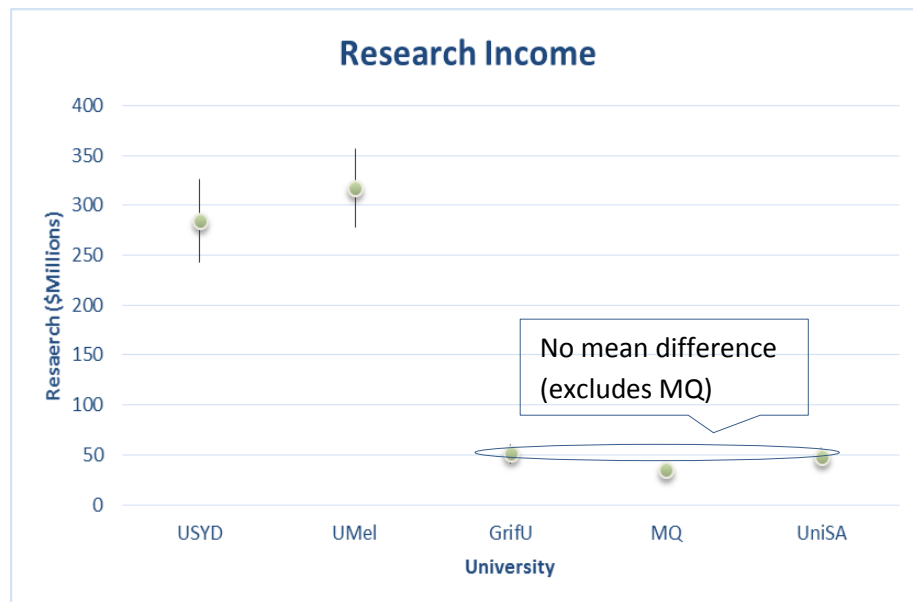


Figure 44 - Research Income 2

Analysing the number of research publications produced at each institution that uses a formula based approach, MQ and UniSA have comparable means (Figure 45). Griffith uses a profit centre based approach, and displays a mean number of publications comparable to both MQ and UniSA. Both USyd and UMelb show means that are comparable, although different to the mean at Griffith.

On a per staff basis, results are similar, showing no mean difference between MQ and UniSA. Further, the mean number of publications per staff member at MQ is the same as USyd, UMelb and UniSA, once again, despite the different budget models used. This result is in contrast to the previous analysis of total research publications (not on a per staff member basis). It is now observable that publication numbers by staff member are comparable between USyd, UMelb, MQ and UniSA, irrespective of the different budgeting models used. On a staff member basis Griffith displayed the lowest number of publications in the sample, while examining the total number of publications it displayed a mean comparable to MQ and UniSA.

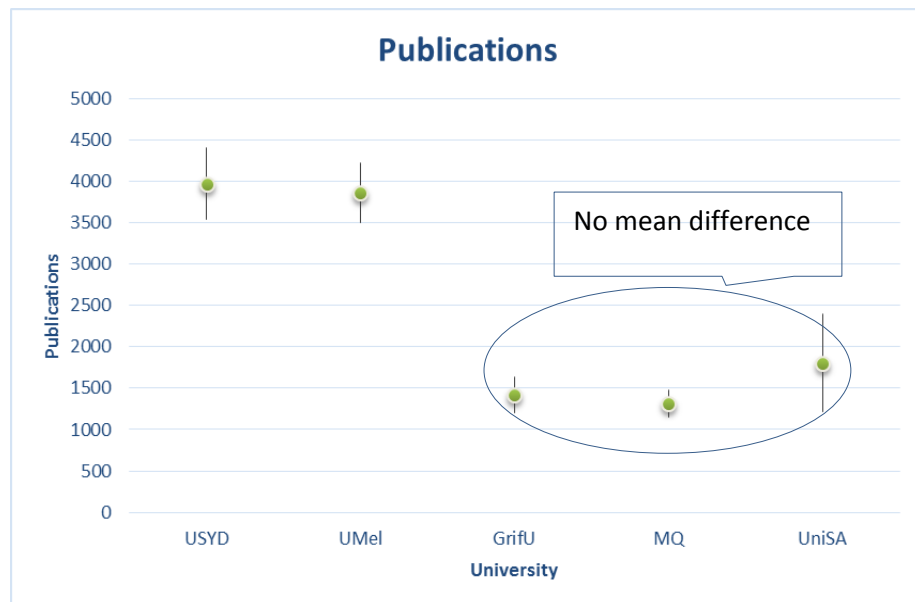


Figure 45 - Publications 2

By staff member, UniSA produces the highest number of publications at 0.75, MQ and USyd produced 0.6 publications, marginally higher than UMelb at 0.57 and GU produced the lowest at 0.4. The mean for UniSA was the highest, although it displays a significantly larger standard deviation at 0.5 compared to the other institutions standard deviation of between 0.05 to 0.08 (Figure 46).

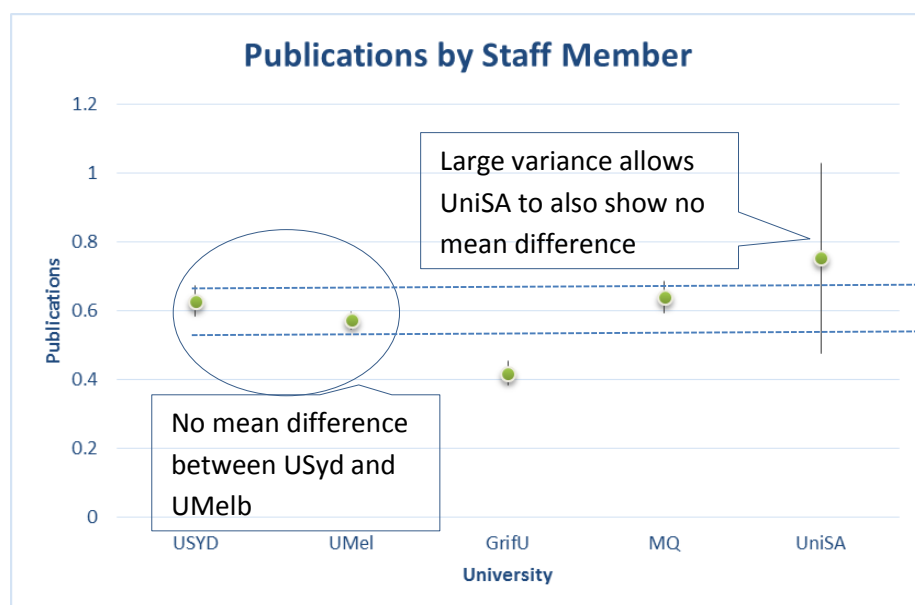


Figure 46 - Publications by Staff 2

A Case Study of Performance – International Student Growth and HDR Completion Rates

This section will explore the relationship between the formula based budgeting model used at MQ and two specific aspects of performance including the number of international students and the completion rate for HDR (higher degree research) students.

The MQ model provides funding on a per student basis, weighted by the field of study with science based areas provided with more funding than arts and business based courses (refer to band and cluster explanation in Chapter 1). Funding provisions are also weighted according to the level of study with undergraduate subjects generally receiving less fee income compared to higher levels of studies such as Master's and PhD students, on an equivalent EFTSL basis. Although the weighting is by field of study, and the level of study (UG, PG or HDR), the model does not provide specific incentive for international students, for attracting HDR students or for completing HDR students.

International students pay significantly higher fees compared to domestic students and the fee discrepancy range is considerable from 9% (science based course areas) to 158% (business related areas), often with a large proportion of international students paying at the higher end of the range, given they often study business related areas. In 2013 MQ had enrolments of 26% (Auditor-General 2014) for international students and combined with the additional fee income earned for these students, the contribution of international students to the overall revenue pool was the highest of all fee categories representing about 30% of income. In 2013, this represented \$223m in revenue. MQ was noted as having the most balanced distribution of revenue between all sources showing no specific or unbalanced reliance on any particular source including Australian Government Grants (Auditor-General 2015). At most other local universities, the balance between Australian Government Grants income was double that of the revenue from international students. At MQ the percentage was approximately equal, highlighting the significance of this cohort and diversity of income, more generally. From a risk perspective though, the Auditor general also noted that MQ was particularly sensitive to changes in the international market given its greater proportion of international student revenue and reliance on international students compared to its peers. MQ's international student cohort grew when growth was apparent nationally, however, in more recent times, the growth and proportion of international students has declined in contrast to the increases experienced more generally within the sector.

Fees from Australian Government Grants are more secure compared to income from international student fees as changes in government policy and within the competitive landscape, for international students, tends to have a far more immediate impact on the number of international students compared to changes in policy impacting domestic students. Changes in domestic policy related to domestic students tends to impact universities over a longer period compared to changes made within policy related to international students (such as the recommendations from the Knight Review), which show far greater degrees of volatility when changes to, say, visa conditions are made.

Marketing and recruitment of international students is supported at MQ, by large teams of staff, solely focused on recruiting international students – as is the case in most Australian Universities. The central team, at MQ, is also supported by a significant effort at the Faculty level to provide staff to travel

throughout the world, to support the recruitment function. The flow on consequences operationally within the university, are that staff that travel, often need to be backfilled so that teaching and or research can continue while they are away, and this potentially has a negative impact on students with the discontinuity of teaching staff - and ultimately adversely impacts the overall student experience.

International students also require additional support compared to local students and these costs are significant (Forbes-Mewett and Nyland 2012), often representing a large proportion of the additional incremental revenue earned. Universities must also comply with the requirements set out in the Education Service of Overseas Students Act 2000 (ESOS Act) that establish legislative requirements and standards for the regulation of education providers which provide high degrees of protection to overseas students with respect to all aspects of their stay including fees, accommodation, security, etc. Complying with the act does create additional costs to universities, and it is expected that these costs are borne by the institution and paid for out of the fees received from this cohort. At institutions that use a profit based budgeting model, the incremental additional revenue per international student are retained within the profit centre (the faculty, school or department), and thus the benefits flow directly. This effect is even more pronounced where accountability is placed on the dollar amount (of returns as opposed to a percentage of fee return). Accountability at a fixed dollar amount provides a mechanism for all amounts over and above the 'target' to be retained by the faculty or school and used to fund operating requirements. The MQ model, in contrast, provides an identical amount of funding for domestic and international students for comparable students (part-time or full-time), studying comparable courses. The model provides no specific incentive to drive behaviour (Ezzamel, Robson et al. 2012, Van Puyvelde, Caers et al. 2012) towards recruiting international students in preference over local students, despite the significant fee difference and university reliance on income from international students.

Faculties are not treated as profit centres under the formula based approach used at MQ, the benefits of the additional incremental fees earned from international students are retained centrally, while the costs of sending staff internationally, the costs to backfill staff places and the additional costs to provide student services are paid by faculties. The fact that international student revenue does not flow through to faculties is not a direct result of the formula based budgeting approach per se, but more so related to the fact that the formula based approach does not build in a metric and incentive specifically related to the recruitment of international students. In theory, the MQ model could easily be amended to include some incentive for attracting international students, consistent with the additional revenue gained from this cohort. Within faculties the revenue from attracting international students is identical to that of local students with significant additional extra effort required, creating a marginal financial case for faculties to support such endeavours. Even though these cases benefit the university as a whole - they only represent break-even cases at the faculty level, at best, although with

significant additional financial and operational risk. This is the main driver for the vastly different financial outcomes at the faculty level compared to the university level, given the budgeting model provides no incentive for attracting international students.

From 2005 to 2014 Australia experienced a 31% increase in overseas students. This peaked in 2010 with approximately 211,312 students (Austrade 2015), dipped to 196,657 in 2013 and was up in 2014 to 210,135. The growth in New South Wales (NSW) from 2005 to 2014 was 15% and also peaked in 2010 with 70,620 students. In 2013, NSW experienced a trough consistent with the national figures and enrolments fell to 63,346. This has since improved to 66,689. The trend at MQ has been different. Over the period from 2005 to 2014 enrolments fell by 4%, and since the peak in 2010, each subsequent year has shown declines in contrast to the national and trend in NSW (Figure 47 - Enrolment Data and Figure 48 - MQ International Enrolment Data).

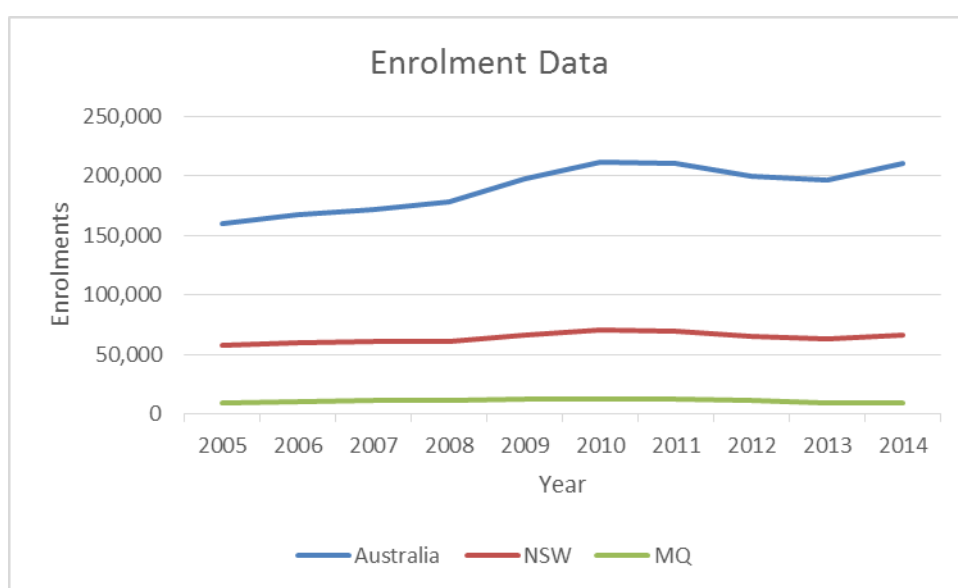


Figure 47 - Enrolment Data

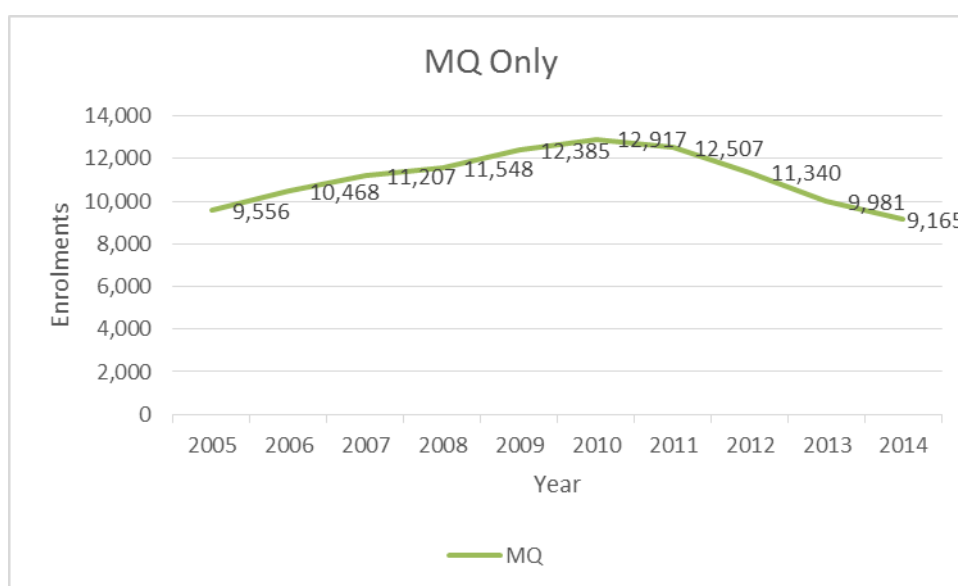


Figure 48 - MQ International Enrolment Data

MQ's overall share of international students was 6% in 2005 and peaked at 6.5% in 2007 (Figure 49). In 2014 MQ share was 4% nationally. In NSW, in 2005 MQ maintained a market share of 16% and this peaked to 18.8% in 2008, and has fallen each year to a share in 2014 of 14%. This significant decline is in contrast to the overall growth in international numbers nationally and in the state of NSW.

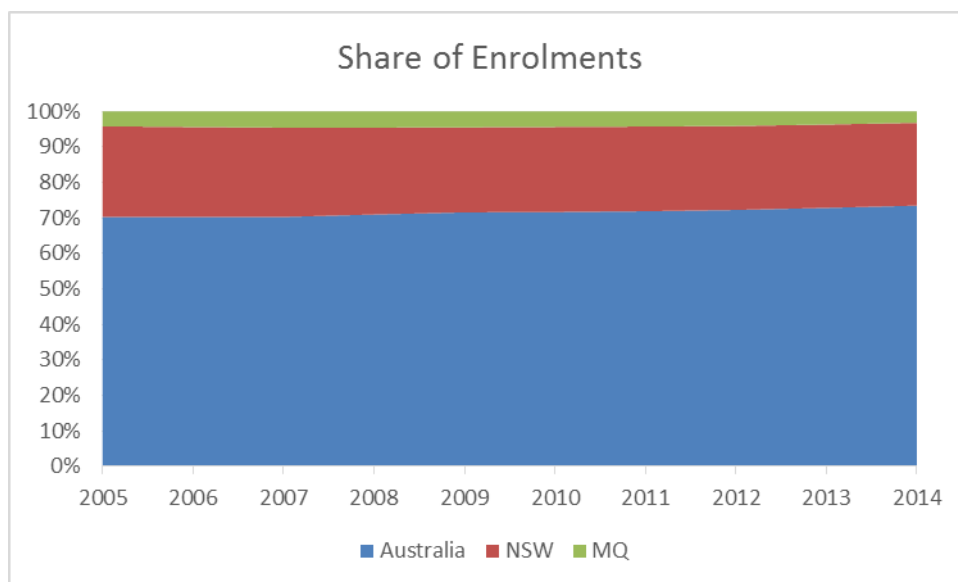


Figure 49 - MQ Share of Enrolments

Statistical tests of correlation were also conducted with respect to international student numbers nationally, within the state of NSW and at MQ. The correlation between the intake at MQ compared to national levels was low at 38% (pearsons correlation, (Salkind 2007) Figure 51) and the relationship was found to be not statistically significant. The relationship between MQ and the international student numbers within NSW was stronger at 61% (Figure 50), as expected given the fact that MQ forms part of a relatively small group of large universities in the state. However, it was found that the relationship between MQ and the intake within NSW was also not statistically significant (Figure 50). The results indicate clearly that both nationally and within the state, other factors have resulted in changes in student numbers compared to MQ, which has not experienced the same incremental trends (upwards). These factors may be internal to MQ, such as the budget model used, the structure of the international student recruitment area, the investment made to attract international students, the attractiveness of the MQ program offerings in comparison to the offerings through the other local universities, the strength of marketing at other universities or other possible external factors.

The correlation results compared to the trend results indicate that comparing these results to the results at MQ does not allow a meaningful assessment given the fact that no relationship exists, including no systematic relationship at the budgeting model level. USyd however does display a statistically significant relationship to the national intake of international students with a 69%

correlation (Pearson's correlation, Figure 52), although the same relationship does not exist between USyd and the international intake within NSW (Section 5 Conclusion). Interestingly, the USyd data does not show a statistically significant relationship with the intake in NSW (Figure 53), consistent with the results of MQ and NSW data. The overall level of consistency in the correlation data indicates that many universities contribute to the overall intake nationally and no single university (of the two under review USyd and MQ) play a dominant part in the total numbers. In which case, the trend data may be a good overall estimate of the underlying demand from international students and the university specific results indicate the overall level of that demand attracted by each university.

MQ Vs NSW

Correlations: NSW, MQ Enrolments

Pearson correlation of NSW and MQ Enrolments = 0.610

P-Value = 0.061

Ho $p = 0$

H1 $p \text{ not} = 0$

At 95% CI (alpha = .05)

P is NOT low thus cannot reject the null

Thus no statistical relationship between MQ and NSW results

Figure 50 - Correlation International (MQ vs NSW)

MQ Vs Australia

Correlations: Australia, MQ Enrolments

Pearson correlation of MQ Enrolments and Australia = 0.389

P-Value = 0.266

Ho $p = 0$

H1 $p \text{ not} = 0$

At 95% CI (alpha = .05)

P is NOT low thus cannot reject the null

Thus no statistical relationship between MQ and Au results

Figure 51 - Correlation International (MQ vs Australia)

Correlations: Australia, USyd

Pearson correlation of Australia and USyd = 0.688

P-Value = 0.040

Ho : $p = 0$

H1: $p \text{ not} = 0$

P is low thus reject Ho. Statistically significant relationship between USyd and Australian numbers

Figure 52 - Correlation International (USyd vs Australia)

Correlations: NSW, USyd

Pearson correlation of NSW and USyd = 0.471

P-Value = 0.201

Ho : $p = 0$

H1: $p \neq 0$

P is NOT low thus CANNOT reject Ho. No statistically significant relationship between USyd and NSW numbers

Figure 53- Correlation International (USyd vs NSW)

In relation to the topic of this thesis, a key question is whether MQ's position of excluding the benefits of international revenue within the formula based budgeting approach has adversely impacted performance in this area. Domestic enrolments 2005 to 2014 increased 65% (compared to a 4% decline in international students, over the same period, Figure 54), and over that period MQ's market share in NSW improved marginally from 8% to 9% (ucube, (DeptOfEducation 2015)).

From the data it is clear that MQ has underperformed in international recruitment in relation to other institutions nationally and in the state, while domestic market share has increased marginally. Within the sample studied, only one NSW based university was included which was USyd. USyd had a market share of international students, in 2005 in NSW of 16%, which fell 1% to 15% in 2013. USyd uses a profit centre based budgeting approach that allows a flow through of additional student revenue from international students to faculties, yet they also experienced a marginal decline in international students, while enrolments in the rest of the state grew. The decline however at USyd was only 1% compared to the 4% decline at MQ.

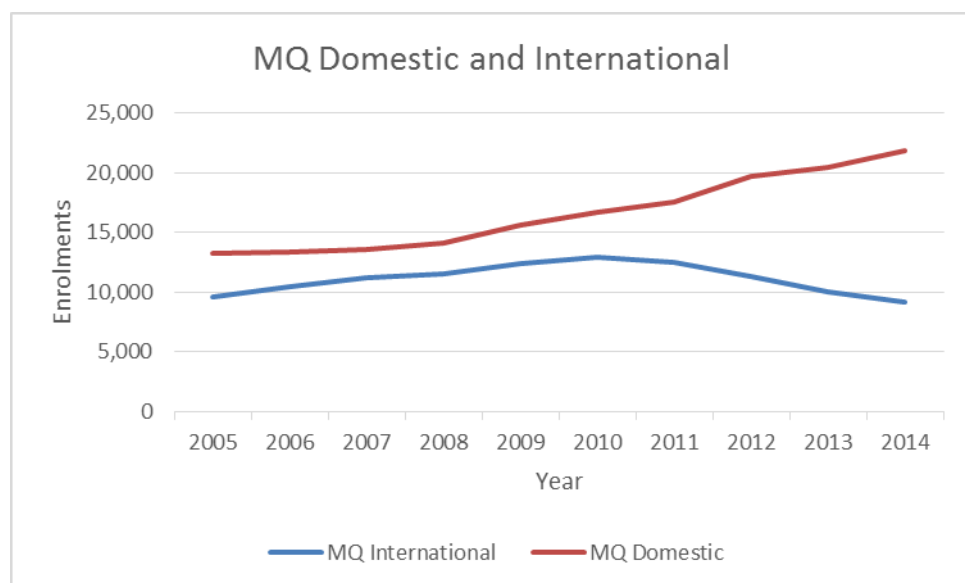


Figure 54 - MQ Domestic and International Student Numbers

Higher Degree Research Completions

Government funding is provided to universities for the cost of research training, primarily via the Research Training Scheme (RTS) and the Joint Research Engagement (JRE) scheme. The RTS funds the costs of students undertaking a PhD or Masters by research (DeptOfEducation 2015) and weights the funding according to three research output measures, the highest of which being 50% funding based on HDR completions. While the JRE scheme provides funding for HDR students while they are progressing through their candidature as opposed to the RTS which provides funding only when they complete. Under the JRE scheme HDR student load comprises 30% of the total amount, per university, with the major category (60%) being funding based on historical research income.

In the same manner in which higher cost undergraduate studies are provided with greater government funding, compared to lower cost areas, the same methodology applies to the completions funding under the RTS scheme – which provides funding for the expense related to delivering the research training. Under this scheme there are 4 funding categories for completions and these include:

- High Cost Doctorate Degree by Research weighted at 4.7
- High Cost Masters Degree by Research weighted at 2.35
- Low Cost Doctorate Degree by Research weighted at 2.0
- Low Cost Masters Degree by Research weighted at 1.0

The high cost doctorate (PhD) and Masters degrees receive 2.35 times more funding than the low cost categories. RTS funding is used to incentivise universities to deliver quantity and quality of outputs with completions measuring the number of skilled researchers produced (quantity) and funding for publications and research income measuring the quality of the environment in which the research was undertaken (DeloitteAccessEconomics 2011).

Within the MQ budgeting model, funding is provided for both the load and completion components for HDR's. The load component attempts to allow a pass through of a proportional amount of the revenue received from government sources via the JRE, while the completions funding component within the MQ model aims to pass through a portion of the RTS funding. The precise quantum of funding for these elements within the MQ model, however, is variable given that the model has 14 variables that determine funding allocation. With a large number of drivers and the fact that the drivers allocate a fixed pool of funding, the correlation between operational performance (say, increasing HDR enrolments) and the amount of funding received at the faculty level, *ceteris paribus*, is low. At the university level, however, the correlation is much higher. In addition, the funding amounts provided to different Faculties is proportional and variable in relation to the amount received by other areas as the size of the monetary allocation pool is always fixed. Thus Faculties that achieve growth at a greater rate than other areas receive proportionally more funding. Under this model, amounts received each

year, per category, differ, and it is also difficult to build revenue based strategies as revenue amounts vary inconsistently from year to year, even when the same outputs are achieved. The MQ models complexity, irrespective of it measuring various outputs, is difficult to understand and also provides inconsistent incentives, thus its ability to actually drive behaviour is low and ineffective.

Funding for students while they are in their candidature, within the MQ model, is weighted based on the relative cost of the students field of study and this rate proportionally matches the amounts provided by the government for either high cost or low cost areas. While completions funding is provided more consistently at a rate comparable to the amount internally allocated for one undergraduate business student multiplied by a factor of 10. (Note the comparison made to an UG business student was only provided to highlight the quantum received for completions; the MQ funding model does not benchmark the completions payment to that of an UG business student).

The MQ model also only provides funding for HDR students while they are in their candidature or once complete, if the student completes within normal timeframes (four years full time study or 8 years part time study). Government funding is provided for HDR students for a period of four years for full time students and 8 years for part time students, thereafter funding for the student while they are in their candidature ceases. The same concept however does not apply for the completions payment. Currently this payment is made to an institution once the candidate completes, irrespective of the completion occurring within a four year or eight year period (for full time and part time students respectively). From an institution perspective though it is in the best interest of staff and student to ensure the student completes within the normal stated times and that standards of quality are maintained (McWilliam, Sanderson et al. 2006), given that a higher degree research degree is usually considered the flagship program for an institution and a low completion rate indicates poor teaching outcomes and/or quality. In addition, once a candidate is out of time (over the four or eight year period of study), the government ceases to make payments for the student through their candidature, thus the cost of supervising this student are borne by the institution without corresponding support from government sources. For this reason also, it is in the institutions best interest to ensure the student completes their study 'in time'.

Universities that adopt a profit based approach to distribute funding will naturally see variations in their income if a systematic issue occurs, where proportionally larger percentages of students exceed the normal completion times. The same cannot be said for universities that adopt a line item budgeting approach or a formula based approach, such as that at MQ. Under both these budgeting approaches, internal budget allocations are more independent of external funding compared to the profit centre based model. Under a formula based allocation model, funding can be provided internally for HDR students, if they are simply counted as a 'student' rather than as a student that is on track to complete within the stated time or not.

HDR completions nationally have been steadily increasing, and since 2008 have increased by an average of 5% p.a., and increasing by 12% between 2012 and 2013 (Figure 55). Over the same period MQ completions increased at an average rate of 8% p.a. and peaked between 2010 and 2011 where the completions rate increased 33% (Figure 56). As can be seen from the graph below, HDR completions have generally been trending upwards over the period and this is consistent with universities becoming more aware of the financial implications, and support requirements, for students that complete outside the normal timeframes.

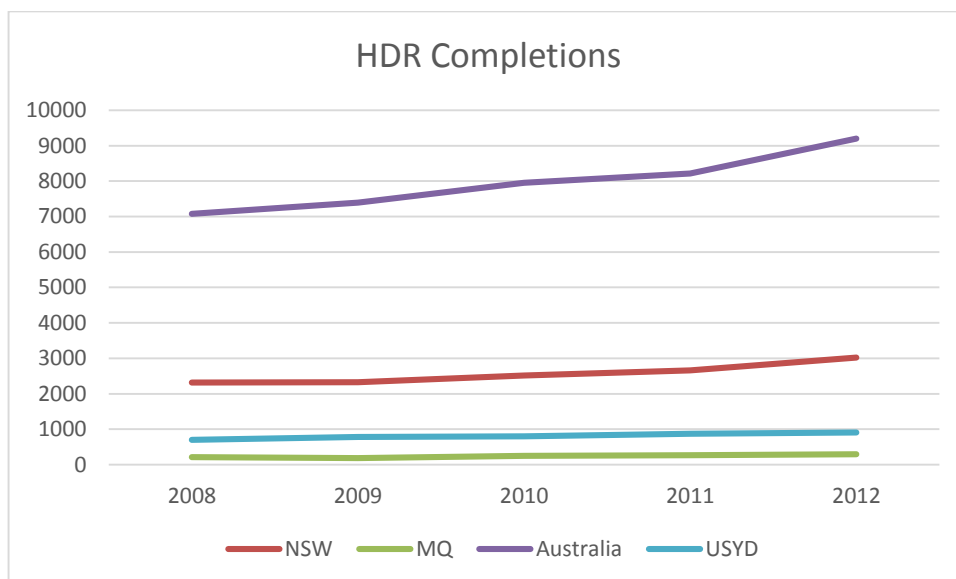


Figure 55 - HDR Completions

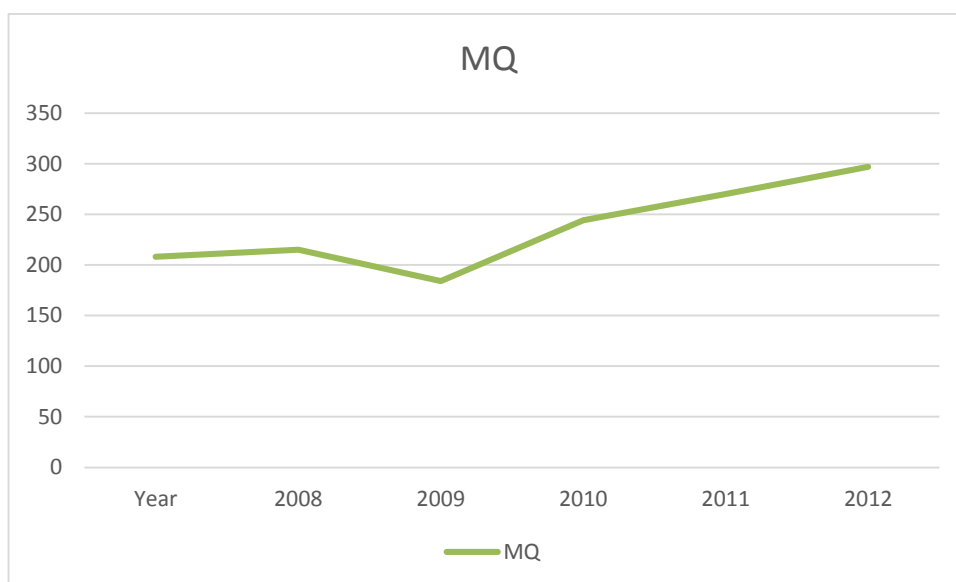


Figure 56 - MQ HDR Completions

Over the 8 year period 2008 – 2013, MQ's share of HDR completions compared to the national total has remained at 3% and has ranged between 9 and 10% compared to the total in NSW. This combined with the steady growth in HDR numbers generally shows that MQ's share has remained relatively stable over the period, and that MQ has kept pace with the steady increase in completions. Statistical

tests of correlation show a significant relationship between MQ completion numbers compared to national and state (NSW) based figures.

Examining the relationship between the completion rates at USyd compared to MQ, we find no statistically significant correlation, which may indicate that the type of budgeting model may be a key factor with the profit based budgeting model at USyd compared to the formula based approach used MQ. To confirm this hypothesis the same tests are performed between MQ and the other universities in the sample that used a profit based budgeting model, namely UMelb and GU; GUwe find a strong statistical correlation in the completion rates which is in contrast to the relationship we observe between USyd and MQ. This additional test indicates that the budgeting model does not influence HDR completion rates.

Given the inconsistent correlation results between MQ and other institutions it is difficult to draw any reliable conclusions about the budget model and its impact on HDR completion rates. Sectorial, completion rates have been improving and to determine more specifically whether the budgeting model used influences these results an expanded sample should be reviewed together with a more in depth review of the internal university policy and procedures that contribute towards better completion rates. The results should then be examined to determine the contribution towards outcomes made by the specific budget model, compared to the policies and procedures.

Summary of Results

Within the sample selected of 5 Australian universities and using 14 measures, it is found that there is no clearly identifiable relationship between the budgeting model used and university performance (Table 4 - Overall Summary of Correlation Results and Hypothesis). The analysis highlights there were as many instances of comparability between universities in the sample that used different budgeting models as there were for those that used the same budgeting model (points 5 and 6 in Table 4). In the case of comparability between universities that used a profit based budgeting model, significantly more of a relationship was visible between USyd and UMelb, with minimal relationship observable between GU and either USyd or UMelb. Within the sample that used a formula based (MQ and UniSA) budgeting approach there were only 2 instances where a relationship was found.

In the sample USyd, UMelb and GU all used a profit based budgeting model. In only one instance was a relationship found between all three institutions and the budgeting model (point 3, Profit Based Budgeting Model, Table 4). Within this test, the results were less than conclusive in that the relationship between revenue and budgeting model was tested, however in the sample, no university changed their approach (in the time period examined). The study and analysis provided a useful comparison of organisational performance related to the budgeting model used, although a more definitive result would have been found had the sample contained instances where the budgeting

model had been changed through the sample period which would have allowed a review of performance pre- and post-budget model change. Within 7 tests a relationship was found to performance between USyd and UMelb, excluding GU (point 6, Table 4). This results indicates clear similarity in performance driven by factors that may or may not include the budgeting model used.

MQ and UniSA were the two universities in the sample that used a formula based budgeting model, and it was found that they displayed comparable performance in only 2 (of the 14) tests (point 3, Formula Based Budgeting Model, Table 4). One of those tests related to the budgeting model used and the relationship to revenue, and as with the same test with the profit based sample, this result too may not be indicative of a true relationship given that the same budgeting model was used throughout the period of analysis. However it was found that with respect to research income, there was a relationship between MQ and UniSA. Within 7 other tests it was found that a relationship existed between universities that used different budgeting models (point 5, Table 4), and in 6 of those instances, the university that used a profit based approach was GU (rather than either USyd or UMelb). This result indicates a strong relationship between GU, MQ and UniSA despite the fact that GU used a different budgeting model. The grouping of these three institutions with respect to performance is clear, as is the relationship between the comparability of results between USyd and UMelb. Of particular interest was the fact that even though GU displayed comparable results to MQ and UniSA, 3 instances included a comparability of results with all three universities, while in 3 other tests, it was found that a relationship existed between GU or UniSA (but not both).

A major difference between USyd and UMelb compared to the other universities in the sample was the age of both these institutions. USyd is 165 years old and UMelb is 162 years old, compared to the next oldest and most established university in the sample being MQ at 50 years old.

Both USyd and UMelb use the same profit based budgeting model, as does GU, although GU only shows a similarity of results to USyd and UMelb when examining the relationship between the budgeting model and revenue. The analysis thus shows a strong relationship between USyd and UMelb although the budgeting model may not account for the relationship to performance. This is the result based on the sample examined in this paper although to more definitively assess this relationship, any future analysis should include a broader sample of universities. A broader analysis should be conducted by including other universities that use a profit based model and by covering a period where the budget model was at universities within the sample was changed. This would facilitate a better understanding of the relationship between the budgeting model and organisation specific performance by examining performance pre- and post-budget model change.

Table 4 - Overall Summary of Correlation Results and Hypothesis

	Hypothesis	Profit Based Budgeting Model	Formula Based Budgeting Model
1. Number of performance measures	1-10, 13	11	
2. Number of general correlation measures	11-12, 14	3	
3. Comparable means between all members of group	1-10, 13	1	2
4. Comparable means although not including all universities in grouping*	1-10, 13	8	Na
5. Comparable means including universities that use different budgeting model	1-10, 13	7	
6. USyd and UMelb comparable means	1-10, 13	7	

* Only applies to sample in profit based models as 3 universities in the sample (point 3 in table). For formula based model comparison see point 2 in the table.

The analysis also clearly shows that even though the same broad budgeting model is used, each institutions model differs with respect to specific measures within each model. Of the profit based models USyd included a workload model, to estimate salary costs, not apparent within the UMelb or GU models. While the UMelb model included a detailed ABC model, while the USyd model uses a far simpler ABC model, and the other institutions tend to use a mix of allocation methods or to simply not allocate overhead costs. The GU model split revenue and costs into categories including teaching, research and other; neither the USyd or UMelb models included this aspect.

The specific factors within each model may be the result of unique issues within each university, not apparent at other universities, or may be representative of management action towards implementing

specific strategies. Specific measures and budget actions may also be the result of political outcomes within the organisation to assert or distribute power (Richard J. Meisinger and W.Dubeck 1984, Bamberger 2012).

Over the sample period no university made significant changes to the budgeting model, although UniSA made a significant change in 2015 from a formula based approach to a profit centre based approach. In addition, both GU and MQ are in the process of changing their budget models. At present GU is making a significant change to their model with a far greater emphasis on costs. Overall, the model will remain as a 'profit centre' based one, although they note that the greater emphasis on costs, within the model, will allow better management of direct costs which has been poor historically. MQ is also in the process of reviewing their budgeting model objectively seeking to create a new model for 2016. The aim of a new budget model at MQ is to address the fundamental issue with the formula based approach, which is accountability, and to create a model that simplifies accountability for revenue generation and one that also drives efficiencies within cost centres.

Of note is the fact that GU, MQ and UniSA are all in the process of implementing significantly revised models to address their different strategic objectives. The refinements are directed towards models that allow greater autonomy at the profit centre level, with the addition of various measures to help drive behaviour within costs centres, much like the models used at USyd and UMelb. The models proposed all aim to address issues of transparency (Carlitz 2013), accountability (Joseph and Burke 2004, Snyder 2006, Kenny 2009, Mahboubbeh and Mohammad Reza 2012, Parker 2013), motivation (Van Puyvelde, Caers et al. 2012) and incentive (López 2006) with a direct and clear relationship between external revenue and internal revenue allocations. The revisions also seek to better assist management to understand the relationship between teaching income, research income, teaching costs and research costs. The separation of teaching and research components aim to address the question of whether teaching subsidises research, the size of any subsidies and the relative impact of any subsidy between different fields of study.

A clear impetus for changes in the budgeting models at GU, UniSA and at MQ, is to increase the level of market and income awareness at all levels within the academic community. This awareness combined with clearer accountability for performance, both financial and non-financial, create an organisation that has more structured and dynamic internal web of links to achieve organisational goals (Kuprenas 2003). In addition to organisations pursuing mission based objectives, budget models are now aiming to provide clear accountability for balancing revenue, margins, profitability and operational outcomes. Massy (1996) highlights that maintaining and enhancing these links and this awareness through the academic community assists in creating an organisation that more effectively balances value related aspects of mission and money (Massy 2012).

The results clearly indicate that two groupings of performance, the first including USyd and UMelb and the second including GU, MQ and UniSA. More conclusively though it is shown that university budgeting models and a relationship to organisational performance (Kong 2005) cannot clearly be made from this analysis. It is suggested that to further explore this question that a wider sample be used with respect to the number of institutions involved, the time frame being examined and ensuring there is sufficient natural variation in the sample showing universities that have changed their budgeting approach.

Section 5 Conclusion

This unique and innovative analysis describes the link between university performance and the choice of organisational budgeting model approaches, and represents the first of this type of work combining finance, accounting, strategy and higher education theory. The higher education sector is experiencing rapid and revolutionary change with growing demands from stakeholders for organisational performance and accountability. The budgeting model is shown to be a key organisational tool to enhance planning and to engage internal and external stakeholders around the achievement of performance goals. Further, the budgeting model forms a key component of the organisational planning cycle with each component fulfilling particular needs, and together, helping to improve organisational engagement and performance.

Within the sample of universities selected, those that use a profit based budgeting model tended to outperform those that use a formula based budgeting model, although the results were potentially confounded with the age and size of the institutions, inhibiting a more definitive link between organisational performance and the type of budgeting model used. Ideally, a future study could address these issues by increasing the sample size and by specifically selecting universities that changed budgeting methods, allowing a review of performance pre- and post-change.

Detailed analysis was completed to review the relationship between two aspects of performance; firstly on international student numbers and secondly, on HDR completion rates at MQ and USyd, to determine if a causal relationship was apparent between performance and the university budgeting model. More specifically the nuances of the budget models at MQ and USyd were examined and it is found that no relationship exists between the budget model and international student intakes or with HDR completion rates. The primary reason for the difficulty in achieving more precise outcomes was the fact that only selected measures were examined, ignoring the multitude of other variables impacting the budgets at MQ and USyd. Future work may address this question and provide stronger results by taking a regression approach and assessing a complete list of variables, rather than a subset only, related to the budget model drivers and the overall organisational performance.

Lastly and importantly, this work highlights and demonstrates the pressures on universities for improved performance, and that universities that use a formula based budgeting model are now moving to profit based models. Universities that used profit based models are also fine tuning their models to clarify accountability and allow transparency of centralised costs within matrix based organisational structures, and that this is being done to improve administrative service performance.

Section 6 Appendix 1

One-Sample T: Rev by EFTSL

Variable	N	Mean	StDev	SE Mean	95% CI
MQ Rev by EFTSL	11	32.17	5.36	1.62	(28.57, 35.77)
USyd Rev by EFTSL	11	45.02	8.92	2.69	(39.03, 51.01)
UMelb Rev by EFTSL	11	53.78	10.20	3.08	(46.93, 60.63)
GU Rev by EFTSL	11	27.76	5.26	1.59	(24.23, 31.29)
UniSA Rev by EFTSL	11	27.55	4.80	1.45	(24.32, 30.77)

Commentary: This tests if there is a mean difference in the revenue per EFTSL for each of the 4 universities. The test shows two distinct groups. Group 1; There is no mean difference between USyd and UMelb, however there is a mean difference to the other universities in the sample. Group 2; there is no mean difference between Macquarie, Griffith and the University of South Australia.

One-Sample T: Retention

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Retention Rate	10	87.979	1.194	0.378	(87.287, 88.671)
USyd Retention Rate	10	88.909	0.578	0.183	(88.574, 89.244)
UMelb Retention Rate	10	90.90	3.31	1.05	(88.99, 92.82)
GU Retention Rate	10	78.864	1.099	0.347	(78.227, 79.501)
UniSA Retention Rate	10	82.822	1.454	0.460	(81.979, 83.665)

Two-Sample T-Test and CI: MQ Rev by EFTSL, USyd Rev by EFTSL

Variable	N	Mean	StDev	SE Mean
MQ Rev by EFTSL	11	32.17	5.36	1.6
USyd Rev by EFTSL	11	45.02	8.92	2.7

Difference = μ (MQ Rev by EFTSL) - μ (USyd Rev by EFTSL)

Estimate for difference: -12.85

90% CI for difference: (-18.33, -7.38)

T-Test of difference = 0 (vs not =): T-Value = -4.10 P-Value = 0.001 DF = 16

Two-Sample T-Test and CI: MQ Rev by EFTSL, GU Rev by EFTSL

Variable	N	Mean	StDev	SE Mean
MQ Rev by EFTSL	11	32.17	5.36	1.6
GU Rev by EFTSL	11	27.76	5.26	1.6

Difference = μ (MQ Rev by EFTSL) - μ (GU Rev by EFTSL)

Estimate for difference: 4.41

90% CI for difference: (0.49, 8.32)

T-Test of difference = 0 (vs not =): T-Value = 1.95 P-Value = 0.066 DF = 19

Commentary: This tests if there is a mean difference in the retention rate between the samples. There is no mean difference between USyd and UMelb. There is a mean difference between MQ and USyd, and no statistical difference between MQ and Griffith. The lowest mean retention rate can be observed at Griffith University. The University of South Australia has a better mean retention rate compared to Griffith. UMelb has the highest mean retention rate followed by USyd and MQ. This also shows the grouping of USyd and UMelb, with varying degrees of difference between the other institutions.

Results for: Combined Data Set

One-Sample T: Attrition

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Attrition Rate	10	11.927	1.191	0.377	(11.237, 12.617)
USyd Attrition Rate	10	10.636	0.489	0.155	(10.353, 10.919)
UMelb Attrition Rate	10	8.75	3.27	1.03	(6.85, 10.65)
GU Attrition Rate	10	20.812	1.112	0.352	(20.167, 21.457)
UniSA Attrition Rate	10	16.832	1.353	0.428	(16.048, 17.616)

Commentary: This tests if there is a mean difference in the attrition rate between the samples. Once again a clear grouping can be observed with no mean difference between students at USyd and UMelb, while the others have varying degrees of difference.

One-Sample T: MQ Success R, USyd Success, UMelb Success, GU Success, ...

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Success Rate	11	83.723	1.658	0.500	(82.816, 84.629)
USyd Success Rate	11	89.995	0.792	0.239	(89.563, 90.428)
UMelb Success Rate	11	92.441	0.428	0.129	(92.207, 92.675)
GU Success Rate	11	84.676	0.880	0.265	(84.195, 85.157)
UniSA Success Rate	10	84.553	0.991	0.313	(83.978, 85.128)

Commentary: This tests if there is a mean difference in the success rate of students. Consistently with the results for retention and attrition there is no mean difference between USyd and UMelb, while the other institutions differ.

One-Sample T: MQ Debt to E, USyd Debt to, UMelb Debt to, GU Debt t, ...

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Debt to Equity	11	0.0909	0.1069	0.0322	(0.0325, 0.1493)
USyd Debt to Equity	11	0.01057	0.02574	0.00776	(-0.00349, 0.02464)
UMelb Debt to Equity	11	0.05015	0.00663	0.00200	(0.04653, 0.05377)
GU Debt to Equity	11	0.05813	0.02298	0.00693	(0.04557, 0.07069)
UniSA Debt to Equity	11	0.01054	0.01768	0.00533	(0.00088, 0.02020)

Commentary: This tests if there is a mean difference in the debt to equity ratio. MQ has a statistically higher mean debt to equity ratio compared to all other institutions. UMelb and Griffith have no mean difference while USyd and UniSA both have a difference compared to MQ and, UMelb and Griffith. This reflects the significant debt MQ has on the Balance Sheet compared to other universities in the sample.

One-Sample T: MQ Net Asset (in '000), USyd Net Ass, UMelb Net Ass, GU Net As, ...

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Net Assets	11	\$1,147,208	\$272,079	\$82,035	(\$998,523, \$1,295,893)
USyd Net Assets	11	\$3,195,175	\$310,019	\$93,474	(\$3,025,756, \$3,364,594)
UMelb Net Assets	11	\$3,341,848	\$475,742	\$143,441	(\$3,081,866, \$3,601,831)
GU Net Assets	11	\$1,350,646	\$530,779	\$160,036	(\$1,060,588, \$1,640,705)
UniSA Net Assets	11	\$659,960	\$194,822	\$58,741	(\$553,494, \$766,426)

Commentary: This tests if there is a mean difference in the net assets of the universities in the sample. USyd and UMelb have the highest net assets with no mean difference between them. MQ and Griffith have statistically lower net assets compared to USyd and UMelb with no mean difference between them. UniSA has the lowest level of net assets, statistically significantly lower than the other universities.

One-Sample T: MQ Research (in '000), USyd Researc, UMelb Researc, GU Resear, ...

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Research Income	11	\$35,490	\$10,084	\$3,040	(\$29,979, \$41,001)
USyd Research Income	11	\$284,046	\$76,198	\$22,974	(\$242,406, \$325,687)
UMelb Research Income	11	\$316,825	\$71,621	\$21,595	(\$277,685, \$355,964)
GU Research Income	11	\$51,150	\$16,932	\$5,105	(\$41,897, \$60,403)
UniSA Research Income	11	\$48,274	\$16,084	\$4,849	(\$39,484, \$57,063)

Commentary: This tests if there is a mean difference in the research income between the samples.

There is no mean difference between USyd and UMelb. Griffith and UniSA have no mean difference and a lower level of research income compared to USyd and UMelb. MQ has no mean difference compared to UniSA however a statistically lower mean compared to Griffith.

One-Sample T: MQ Research , USyd Researc, UMelb Researc, GU Resear, ...

Variable by staff	N	Mean	StDev	SE Mean	90% CI
MQ Research Income	11	\$17,188	\$3,083	\$929	(\$15,504, \$18,873)
USyd Research Income	11	\$44,772	\$10,319	\$3,111	(\$39,132, \$50,411)
UMelb Research Income	11	\$46,578	\$7,189	\$2,168	(\$42,649, \$50,507)
GU Research Income	11	\$14,982	\$3,324	\$1,002	(\$13,166, \$16,799)
UniSA Research Income	11	\$19,052	\$4,969	\$1,498	(\$16,336, \$21,767)

Commentary: This tests if there is a mean difference in the research income per staff member between the samples. This analysis shows that USyd and UMelb have a statistically higher mean compared to the other universities and the mean difference between them is not significant. The other three institutions have no mean difference between them ie MQ, Griffith and UniSA, although statistically lower than that of the USyd and UMelb grouping.

One-Sample T: MQ Publicati, USyd Publica, UMelb Publica, GU Public, ...

Variable	N	Mean	StDev	SE Mean	90% CI
MQ Publications	11	1314.1	305.7	92.2	(1147, 1481)
USyd Publications	11	3972	793	239	(3539, 4405)
UMelb Publications	11	3868	662	200	(3506, 4229)
GU Publications	11	1414	397	120	(1197, 1631)
UniSA Publications	11	1807	1084	327	(1214, 2400)

* NOTE * All values in column are identical.

* NOTE * All values in column are identical.

Commentary: This tests if there is a mean difference in the number of research publications between the samples. This analysis shows that USyd and UMelb have a statistically higher mean compared to the other universities and the mean difference between them is not significant. The other three institutions have no mean difference between them ie MQ, Griffith and UniSA, although statistically lower than that of the USyd and UMelb grouping.

One-Sample T: MQ Publicati, USyd Publica, UMelb Publica, GU Public, ...

Variable by staff	N	Mean	StDev	SE Mean	90% CI
MQ Publications	11	0.6388	0.0830	0.0250	(0.5935, 0.6842)
USyd Publications	11	0.6268	0.0806	0.0243	(0.5827, 0.6708)
UMelb Publications	11	0.5708	0.0452	0.0136	(0.5461, 0.5955)
GU Publications	11	0.4171	0.0638	0.0192	(0.3822, 0.4520)
UniSA Publications	11	0.752	0.506	0.153	(0.476, 1.029)

Commentary: This tests if there is a mean difference in the number of research publications per staff member between the samples. This analysis shows that MQ, USyd and UMelb have a statistically higher mean compared to the other universities and the mean difference between them is not significant. Griffith and UNiSa have means that are statistically different with Griffith having the lowest rate compared to all in the sample.

MQ Correlations: EFTSL, Research Income

Pearson correlation of EFTSL and Research Income = 0.820

P-Value = 0.002 (Ho; p = 0, Independent. Ha; p not = 0)

Results for: Uni of SA

Uni Sa Correlations: EFTSL, Research Income

Pearson correlation of EFTSL and Research Income = 0.884

P-Value = 0.000

Results for: Griffith

Griffith Correlations: EFTSL, Research Income

Pearson correlation of EFTSL and Research Income = 0.891

P-Value = 0.000

Results for: UoMelb**Uni of Melb Correlations: EFTSL, Research Income**

Pearson correlation of EFTSL and Research Income = 0.604

P-Value = 0.049

Results for: USyd**USyd Correlations: EFTSL, Research Income**

Pearson correlation of EFTSL and Research Income = 0.395

P-Value = 0.229

Commentary: This tests if there is a correlation between EFTSL and Research Income. In all cases there is a statistically significant relationship between EFTSL and research income.

Results for: MQ**Correlations: Research Income, Staff Numbers**

Pearson correlation of Research Income and Staff Numbers = 0.915

P-Value = 0.000 (Ho; $p = 0$, Independent. Ha; $p \neq 0$)

Results for: Uni of SA**Correlations: Research Income, Staff Numbers**

Pearson correlation of Research Income and Staff Numbers = 0.953

P-Value = 0.000

Results for: Griffith**Correlations: Research Income, Staff Numbers**

Pearson correlation of Research Income and Staff Numbers = 0.924

P-Value = 0.000

Results for: UoMelb**Correlations: Research Income, Staff Numbers**

Pearson correlation of Research Income and Staff Numbers = 0.905

P-Value = 0.000

Results for: USyd**Correlations: Research Income, Staff Numbers**

Pearson correlation of Research Income and Staff Numbers = 0.736

P-Value = 0.010

Commentary: This tests if there is a correlation between research income and staff numbers. In all cases there is a statistically significant correlation.

Results for: MQ

Correlations: Total Revenues from Continuing, Net Assets

Pearson correlation of Total Revenues from Continuing and Net Assets = 0.985

P-Value = 0.000 (Ho; $p = 0$, Independent. Ha; $p \neq 0$)

Results for: Uni of SA

Correlations: Total Revenues from Continuing, Net Assets

Pearson correlation of Total Revenues from Continuing and Net Assets = 0.985

P-Value = 0.000

Results for: Griffith

Correlations: Total Revenues from Continuing, Net Assets

Pearson correlation of Total Revenues from Continuing and Net Assets = 0.986

P-Value = 0.000

Results for: UoMelb

Correlations: Total Revenues from Continuing, Net Assets

Pearson correlation of Total Revenues from Continuing and Net Assets = 0.937

P-Value = 0.000

Results for: USyd

Correlations: Total Revenues from Continuing, Net Assets

Pearson correlation of Total Revenues from Continuing and Net Assets = 0.977

P-Value = 0.000

Commentary: This tests if there is a correlation between revenue and net assets. In all cases there is a statistically significant correlation.

Results for: Revenue and Budget Model

Correlations: Revenue, Budgeting Model

Pearson correlation of Revenue and Budgeting Model = -0.656

P-Value = 0.000

Commentary: This tests if there is a correlation between revenue and the budget model used. There is a statistically significant correlation. In this test all revenue was grouped with the corresponding budget model, and the correlation was conducted on that basis.

The following correlations were performed to test any other relationships. No commentary is provided as the tests were conducted to determine if any unexpected results occurred, worthy of further analysis. No such findings occurred.

Results for: MQ

Correlations: Total Revenues from Continuing, Research Income

Pearson correlation of Total Revenues from Continuing and Research Income =

0.934

P-Value = 0.000

Results for: Uni of SA

Correlations: Total Revenues from Continuing, Research Income

Pearson correlation of Total Revenues from Continuing and Research Income =

0.966

P-Value = 0.000

Results for: Griffith

Correlations: Total Revenues from Continuing, Research Income

Pearson correlation of Total Revenues from Continuing and Research Income =

0.946

P-Value = 0.000

Results for: UoMelb

Correlations: Total Revenues from Continuing, Research Income

Pearson correlation of Total Revenues from Continuing and Research Income =

0.910

P-Value = 0.000

Results for: USyd

Correlations: Total Revenues from Continuing, Research Income

Pearson correlation of Total Revenues from Continuing and Research Income =

0.842

P-Value = 0.001

Commentary: This tests if there is a correlation between revenue and the research income. In all cases the relationship was statistically significant. Research income is treated as income, for accounting purposes, in the year the grant was awarded.

Results for: MQ

Correlations: Debt to Equity, Research Income

Pearson correlation of Debt to Equity and Research Income = 0.864

P-Value = 0.001

Results for: Uni of SA

Correlations: Debt to Equity, Research Income

Pearson correlation of Debt to Equity and Research Income = -0.878

P-Value = 0.000

Results for: Griffith

Correlations: Debt to Equity, Research Income

Pearson correlation of Debt to Equity and Research Income = -0.496

P-Value = 0.121

Results for: UoMelb

Correlations: Debt to Equity, Research Income

Pearson correlation of Debt to Equity and Research Income = -0.042

P-Value = 0.902

Results for: USyd

Correlations: Debt to Equity, Research Income

Pearson correlation of Debt to Equity and Research Income = 0.396

P-Value = 0.228

Results for: MQ

Correlations: Debt to Equity, EFTSL

Pearson correlation of Debt to Equity and EFTSL = 0.934

P-Value = 0.000

Results for: Uni of SA

Correlations: Debt to Equity, EFTSL

Pearson correlation of Debt to Equity and EFTSL = -0.698

P-Value = 0.017

Results for: Griffith

Correlations: Debt to Equity, EFTSL

Pearson correlation of Debt to Equity and EFTSL = -0.659

P-Value = 0.027

Results for: UoMelb

Correlations: Debt to Equity, EFTSL

Pearson correlation of Debt to Equity and EFTSL = -0.445

P-Value = 0.170

Results for: USyd

Correlations: Debt to Equity, EFTSL

Pearson correlation of Debt to Equity and EFTSL = 0.823

P-Value = 0.002

Results for: Combined Data Set

Correlations: MQ Success Rate, MQ Net Assets

Pearson correlation of MQ Success Rate and MQ Net Assets = -0.754

P-Value = 0.007

Results for: Uni of SA

Correlations: Success Rate, Net Assets

Pearson correlation of Success Rate and Net Assets = 0.468

P-Value = 0.172

Results for: Griffith

Correlations: Success Rate, Net Assets

Pearson correlation of Success Rate and Net Assets = -0.199

P-Value = 0.558

Results for: UoMelb**Correlations: Success Rate, Net Assets**

Pearson correlation of Success Rate and Net Assets = 0.797

P-Value = 0.003

Results for: USyd**Correlations: Success Rate, Net Assets**

Pearson correlation of Success Rate and Net Assets = -0.588

P-Value = 0.057

HDR Completions Statistical Tests

Correlations: Australia, USyd

Pearson correlation of Australia and USyd = 0.922

P-Value = 0.009

P is low. Thus statistically significant ie P not = 0

Correlations: NSW, USyd

Pearson correlation of NSW and USyd = 0.901

P-Value = 0.014

P is low. Thus statistically significant ie P not = 0

Correlations: Australia, MQ

Pearson correlation of Australia and MQ = 0.914

P-Value = 0.011

P is low. Thus statistically significant ie P not = 0

Correlations: NSW, MQ

Pearson correlation of NSW and MQ = 0.940

P-Value = 0.005

P is low. Thus statistically significant ie P not = 0

Correlations: MQ, USyd

Pearson correlation of MQ and USyd = 0.806

P-Value = 0.053

Correlations: MQ, UMElb

Pearson correlation of MQ and UMElb = 0.123

P-Value = 0.816

Correlations: MQ, Griffith

Pearson correlation of MQ and Griffith = 0.703

P-Value = 0.119

Table 5 - University Abbreviation Codes

University Code	Name
BII	Batchelor Institute of Indigenous Tertiary Education
ND	University of Notre Dame Australia
USC	University of the Sunshine Coast
SCU	Southern Cross University
UC	University of Canberra
CQU	Central Queensland University
CDU	Charles Darwin University
BAL	University of Ballarat
USQ	University of Southern Queensland
UNE	University of New England
ACU	Australian Catholic University
MUR	Murdoch University
ECU	Edith Cowan University
FLIN	Flinders University
JCU	James Cook University
CSU	Charles Sturt University
VU	Victoria University
UW	University of Wollongong
SWIN	Swinburne University of Technology
UTAS	University of Tasmania
UNSA	University of South Australia
LAT	La Trobe University
UWS	University of Western Sydney
UTS	University of Technology, Sydney
UN	University of Newcastle
MQ	Macquarie University
DEA	Deakin University
UA	University of Adelaide

CU	Curtin University of Technology
GU	Griffith University
RMIT	RMIT University
QUT	Queensland University of Technology
UWA	University of Western Australia
ANU	Australian National University
UNSW	University of New South Wales
UQ	University of Queensland
MON	Monash University
SYD	University of Sydney
MEL	University of Melbourne

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